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# The 10th MMV Conference: Managing outdoor recreation experiences in the Anthropocene – Resources, markets, innovations

Øystein Aas, Monica Breiby, Sofie K. Selvaag, Per-Ambjørn Eriksson, Brigithe Børrestad (editors)

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Øystein Aas, Faculty of Environmental Sciences and Natural Resource Management, Norwegian University of Life Sciences, Ås, Norway.

Monica A. Breiby, Per-A Eriksson, Brigithe Børrestad, Inland Norway University of Applied Sciences, Lillehammer/Rena, Norway

Sofie K. Selvaag, Norwegian Institute for Nature Research, Lillehammer, Norway

# International Conference on Monitoring and Management of Visitors to Recreational and Protected Areas (MMV) #10: Managing outdoor recreation experiences in the Anthropocene – Resources, markets, innovations

Hosted from Lillehammer, Norway, 16th – 19th August 2021

Website: www.mmvconference.org

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Inland Norway University of Applied Sciences (HINN) – https://eng.inn.no/
Norwegian Institute for Nature Research (NINA) – www.nina.no

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# Introduction

As part of the final sessions at the successful MMV9, in Bordeaux, France in 2018, the Norwegian University of Life Sciences (NMBU) and its partners the Inland Norway University of Applied Sciences (HINN) and the Norwegian Institute for Nature Research (NINA) were granted the role of hosting the 10th MMV conference in 2020. An eager organisation started working already late 2018 with the preparations chaired by Professor Jan Vidar Haukeland, who later retired from NMBU and therefore stepped down as the conference chair. Little did we know at that time about the challenges the globe would face a year later. A website was established, and we started marketing the conference while arrangements and contracts were signed at the venue, which was selected to be Lillehammer, Inland Norway, near many of Norway's iconic national parks, and a former Olympic host city. We planned excursions, receptions, poster sessions and different choices of accommodation, as well as post-conference tours. A number of highly relevant session proposals were received and approved.

When Covid-19 suddenly appeared in March 2020, it soon proved that the planning for the time being was of little use. It became rather soon clear that we could not host and complete MMV10 as we had planned in August 2020. In close communication with the international steering group for the MMV conferences, the natural decision was to postpone the conference to August 2021, with the aim of hosting it as planned – as a physical conference in Lillehammer. Our partners and sponsors were understanding and supportive of our decisions which of course made all changes easier. During the autumn of 2020, we were hopeful that we could complete the conference as originally planned. This was until we saw the second and third Covid-19 waves growing in the late autumn and winter 2020/2021. In January 2021, we decided, again in close dialogue with the international steering committee, to plan for a digital conference. When this decision was taken, it was full speed ahead. While we were anxious about the response from potential contributors and participants, we were happy and relieved when deadlines started to come closer and we witnessed strong interest from participants and contributors. As we go into the final weeks of preparations, MMV10 seems to attract the largest number of accepted abstracts for presentations, as well as the highest ever number of participants. Around 180 abstracts and nearly 300 participants from more than 30 countries have registered.

The pandemic caused by Covid-19 has hit the nature-based tourism sector severely, while at the same time nature, often near people's homes, has proved to be immensely important as a refuge and place for retreat from a monotonous life where many have experienced lock-ins. The pandemic lead to the closure of many other leisure activities and offerings, as well as organised sports, leaving outdoor life as one of the few alternatives to being indoors and at home. A true crisis but also a possibility to seek new ways towards a more sustainable use of natural areas.

On this background, the theme for the MMV10 - *Managing outdoor recreation experiences in the Anthropocene – Resources, markets, innovations* – is maybe even more relevant now than when it was coined in 2018. It might be argued that global pandemics is a direct and severe consequence of the Anthropocene, which urgently calls for better management, improved protection of the natural resources that form the basis for tourism and recreation, true innovations and new ways of handling these challenges. Due to the pandemic, the conference has added a voluminous session dealing specifically with the consequences of Covid-19.

Hosting conferences in the midst of a global pandemic is also economically challenging. The organisers are most thankful to all our sponsors for their enduring support and trust in our dynamic, changing plans! Thank you, especially to our main sponsors Innlandet County Council, the Norwegian Environment Agency and the Norwegian Research Council. We also feel sorry for all the local accommodation- and service businesses in and around Lillehammer, which cancelled all our pre-bookings without any complaints, despite they are living through challenging times. Hopefully, there will be opportunities later.

We, the hosts, are eager to start MMV10, but also rather excited and nervous looking forward to the event. Running a full-digital international conference is something new to most of us, even though our technical personnel have gained much experience over the last 12 months. While we look forward to everything, we also want to remind all participants that scientific conferences are what you make out of them, the more active you are, the larger will the benefits be, in terms of ideas, insights, knowledge and new networks! We encourage all participants and contributors to join in the co-creation!

See you soon!

***Øystein Aas***
***Monica Adele Breiby***
*Conference co-chairs*

**Disclaimer**
This report is finalised 6th August 2021. Minor changes in the List of Participants as well as slight changes to the overall abstract program might occur between 6h August 2021 and the conference. These changes will be available on the website: https://virtual.oxfordabstracts.com/#/event/2084/program. In case of differences for instance in number of presentations, sessions, presentation order, it is always the website which is updated and should be followed.

# Table of Contents

# Plenary keynote presentations

| SESSION | PART | DATE | TIME | CHAIRS |
|---|---|---|---|---|
| 1 | I | Monday 16th August | 15.00 – 17.00 CET | Øystein Aas & Monica Breiby |
| 2 | II | Tuesday 17th August | 12.00 – 14.00 CET | Marit Roland & Øystein Aas |
| 3 | III | Wednesday 18th August | 12.00 – 14.00 CET | Hans Fredrik Hoen & Monica Breiby |
| 4 | IV | Thursday 19th August | 15.00 – 16.00 CET | Monica Breiby, Jon Museth & Øystein Aas |

| | **Programme** |
|---|---|
| *Part I* | Human-wildlife interactions: The challenge of monitoring socio-ecological dimensions in Norwegian National Parks *by Dr. Vegard Gundersen* |
| | Overtourism in Iceland: Myth or reality? *by Anna Dóra Sæþórsdóttir* |
| *Part II* | The Anthropocene and what it means for managing outdoor recreation experiences *by Prof. James Higham* |
| | The impacts of the pandemic on tourism in protected and recreational areas *by Dr Anna Spenceley* |
| *Part* | "Friluftsliv" (outdoor life): Sustainability, trust and social inclusion *by Dag Terje Solvang* |
| *III* | The need for Local Community Resilience in Sustainable Tourism *by Judy Kepher Gona* |

## Human-wildlife interactions: The challenge of monitoring socio-ecological dimensions in Norwegian National Parks

***Dr. Vegard Gundersen**, Norwegian Institute for Nature Research*

Habitat loss, fragmentation, and degradation are the principal threats to biodiversity worldwide. In addition to the direct changes to the habitat caused by human activity, the mere presence of humans can prevent wildlife from accessing otherwise intact patches of habitat. This is exemplified by a wide-ranging species, wild reindeer (*Rangifer tarandus tarandus)* in Norway. During winter, reindeer rely on lichens that are both vulnerable for wear and slow to regenerate. In summer months, the reindeer follow the retreating snowpack as they seek greener vegetation and insect-free calving pastures. The wild reindeer is a challenging species to manage. It is adapted to survive in a mountain environment with extremely variable foraging conditions that require extensive seasonal movements. Human development of different kind of infrastructure, combined with increased human presence in their environment, mainly for for recreational purposes, have created an ever-changing disturbance regime. To monitor the human use component in this context, include the metrics of visitors' spatial extent, temporal extent and variability, volume, type of activity and characteristics.

Marked trails between tourist cabins are the most common infrastructure within wild reindeer ranges, and trail systems often transect large remote areas in such a way that that wild reindeer herds are forced to cross marked trails frequently. The key question is: what level of human disturbance can reindeer herds tolerate, in terms of user numbers per unit of time, before the reindeer movements are either severely hampered or cease altogether? The human use of trails within a wild reindeer range inevitably varies considerably during the summer peak tourist season. Some trail segments see as few as 1 person/day, while other segments have more than 500 person/day. The intensity of use can also vary considerably between different types of trails or paths and the terrain they cross. NINA uses several different methods to collect data on the spatiotemporal pattern of human presence in large mountain areas where use is widely dispersed: automatic counters (TrafX, EcoCounter), GPS surveys (Trackstics), asking visitors to draw their trips on a map, systematic moment observations, mobility bigdata (e.g. the Strava training smartphone app), and different kinds of secondary data. This talk will address these methods and give examples of potential methodological biases.

Our findings from monitoring the effects of visitors in seven wild reindeer ranges revealed that the human footprint and the disturbance effects on reindeer is much larger in summertime than wintertime: a function of both the volume and patterns of human activity and inter-seasonal changes in reindeer behavior. We found a large-scale area segregation between humans and reindeer during the summer season when human activity is greatest, as wild reindeer move to areas less prone to disturbance by humans. We identified threshold values for animals' willingness to cross hiking trails in summer: herds started avoiding crossing hiking trails used by more than 10–15 persons per day and stopped crossing trails when visitor volumes exceeded 30–50 persons per day. During the hunting season in the fall, reindeer herds were more dispersed and animals were willing to cross hiking trails independent of visitor volume—indicating a collective flight response to hunters.

The intensity of human activities (e.g. tourist volume), and the density of infrastructure (e.g. density of trails and mountain cottages) are crucial to understand how reindeer movements respond to anthropogenic features in the landscape. Multiple sources of human disturbance interact to produce cumulative impacts, which manifest in both habitat loss and fragmentation. Our research team has developed a multi-step analytical framework to quantify cumulative impacts and guide sustainable land planning and management. We applied this approach to reindeer GPS data collected form more than a decade in the major herds across Norway to: 1) quantify reindeer habitat's functionality (i.e. areas that are simultaneously of high-quality and well-connected) and the movement corridors between functional areas; 2) quantify the human footprint, or the

cumulative impact of anthropogenic activities. The talk will provide examples of how data from human use can be used in such analyses.

Management of backcountry hiking areas primarily concerns trail use, since most visitors to national parks utilize the marked trails. Trail restrictions and manipulation of the trail infrastructure (i.e. rerouting trail corridors or removing mountain cabins) can have effects on the volume of cabin-to-cabin trekking, the number of foreign visitors, visitors' gender balance, and number of first-time visitors. Similarly, the kind of area use restrictions (which can vary in both space and time) can impact or potentially provoke visitors differently, depending on the characteristics of the visitors' demographics and the activities they pursue. For example, areas subject to restrictions might have consequences primarily for local users, such as farmers who are tending to grazing herds of domestic sheep and residents of adjacent municipalities who are pursuing substitute harvesting (i.e. hunting, fishing, berry-picking etc.). Alternatively, areas might also be visited by wilderness seekers who have travelled considerable distances to reach the park and mainly use the off-trail areas.

Understanding visitors' motives, experiences, preferences, and sensitivity to management-generated information about responsible behaviour in reindeer areas can help managers design information strategies that are better able to direct human activity in environmentally friendly directions. We used short questionnaires distributed at self-registration checkpoints (located in combination with automatic counters at parks' main entrances) or QR-code to collect information about user profiles and the purpose of their visit, as well as asking them to draw a map of their route. We also asked visitors for their email address so that we could send them a more comprehensive web-based questionnaire after the visit. Our results illustrate how visitors' characteristics can differ based on which park entrance they use and the activity they pursue, reflecting variation in demography, nationality, frequency of visiting the location, knowledge about the area, group-size, and presence of children—as well as their preferences for landscapes, facilities and management. It is crucial to take these dimensions of park visitors into account to project the possible effects and consequences of different kinds of direct and indirect management actions in the future.

## Overtourism in Iceland: Myth or reality?

**Anna Dóra Sæþórsdóttir**, University of Iceland, Iceland

Large influxes of tourist arrivals have become a major challenge in recent years for many nature-based destinations. Seasonality, uneven spatial distribution and imbalance between supply and demand are commonly pointed out as part of the problem. In recent years the concept of overtourism has emerged in that context in the media and increasingly in academia as a way of describing this situation, although the issues behind the term have been a component of visitor and tourism research for many years. Iceland is one of the destinations which has been most associated with the concept of overtourism – at least in the international media discourse. This is a reflection of the enormous increase in international tourist arrivals the country has received in the last decade. In 2010 the number of international visitors to Iceland was about 460,000, by 2018 it had reached approximately 2.3 million, representing an annual average increase of about 22%. Iceland is the most sparsely populated country in Europe, with about 370,000 inhabitants on an island little over one hundred thousand square kilometers. Iceland's main tourist attraction is nature, with its perceived wilderness landscape. There are a few tourist hotspots on the island, which up to half of all international tourists visit. This has resulted in crowding at the most popular destinations which in turn has led to a decrease in the quality of the tourist experience, overloaded infrastructure, damage at nature destinations and shifts in the perceived nature of the Icelandic landscape.

This presentation provides an overview of the different ways in which overtourism has revealed itself at a national level in Iceland. It is both based on a primary and secondary data analysis strategy. Furthermore, it is based on longitudinal research conducted on tourists' experience of overcrowding at various nature destinations in Iceland over 20 years. During this time span, over 43,000 questionnaires were completed and in-depth interviews were conducted with several hundred tourists. This allows for a detailed empirical assessment to be made of changes in visitor attitudes, experiences, perceptions and satisfaction with specific locations in Iceland and the development of a broader understanding of Iceland as a nature-based tourism destination over time. The latter includes changes in the make-up of tourist attributes and shifts in the management challenges nature-based destinations are facing from tourism. Finally, Iceland's various responses to its success as a major nature tourist destination will be discussed.

Early 2020, there were speculations if the party was over as the number of international tourist arrivals in Iceland had decreased more than 15% from the previous year. While this degrowth was highly appreciated by some, it worried others, not least the tourism industry. For them questions arose, including whether this meant that Iceland was not on the "bucket list" anymore? Did the island become too renowned or fashionable? Coincidentally, with the emergence of the Covid-19 pandemic overtourism in Iceland was truly over, at least for a while. The summer of 2021 looks promising, and the tourism industry has high hopes for bouncing back quickly. While it is unclear whether this means that the country is on its way to becoming plagued by overtourism (again), the example of Iceland underlines the importance of long-term visitor research through longitudinal studies. It stresses the relevance of addressing the questions of how we can understand the nature of change in destinations and how research should be best communicated at a time when nature and wilderness are facing more challenges than ever from tourism and environmental change.

## The Anthropocene and what it means for managing outdoor recreation experiences

**Prof. James Higham**, Department of Tourism, University of Otago, Aotearoa (New Zealand)

The global COVID-19 pandemic has, first and foremost, been a widespread human tragedy. It has also been a global social and economic circuit-breaker. The disruption that it has caused has been all embracing, and from this has emerged a fleeting opportunity to rethink all aspects of environment, society and economy. In the context of tourism and recreation, the current crisis has been widely recognised as a once-in-a-lifetime opportunity to 'build back better' and, in doing so, to try to address fundamental global environmental challenges.

Twenty years ago, at the dawn of the new millennium Crutzen and Stoermer's (2000) article '*The Anthropocene*' argued that the Holocene had ended and a new epoch, for which humankind is responsible, had begun. Anthropogenic climate change, pollution, species extinction, exhaustion of soils, over-exploitation of resources, and population growth were seen as evidence of the Anthropocene. The concept of the Anthropocene has become prominent in the tourism and recreation literature. Many of the central rationales for the Anthropocene – such as climate change, resources depletion, and pollution – are also central concerns associated with pre-COVID growth in tourism and recreation. If our species is a geological force and the impacts are of tourism and recreation are geophysical in scope, this significantly increases the ethical stakes associated with our fields of scholarship.

To begin, I will frame my presentation with an initial discussion and critique of the Anthropocene and what it means. In this discussion the locus of responsibility is important. It is necessary to question how particular topics of debate come to the fore and who stands to benefit from how public issues are framed. Visions of tourism and recreation development are interwoven with assumptions regarding who stands to benefit and who will bear the costs associated with those benefits.

I will use this critique to consider two of the most fundamental environmental challenges confronting tourism and recreation scholarship; carbon emissions and biodiversity loss. I will draw upon the emerging 'regenerative tourism' paradigm to consider how tourism and recreation can contribute to restoring and regenerating rather than depleting natural capital, while simultaneously building social, cultural and economic capital. This discussion has important implications for tourism and recreation, in terms of pathways forward in the quest for practices that respond with urgency to the these global environmental imperatives. This presentation will be illustrated with emerging examples from Aotearoa (New Zealand).

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## The impacts of the pandemic on tourism in protected and recreational areas

**Dr Anna Spenceley**, Chair, IUCN World Commission on Protected Areas (WCPA) Tourism and Protected Areas Specialist Group; Director, Global Sustainable Tourism Council

**What impacts has COVID-19 pandemic had on nature-based tourism in Africa?**

Before the COVID-19 pandemic, over a third of all direct tourism contributions to gross domestic product (GDP) in Africa, and 8.8 million jobs were attributed to wildlife tourism globally in 2018 (1). The UN World Tourism Organisation estimates that entrance, gate and park fees from all types of protected areas in 14 sub-Saharan African countries were estimated US$ 142 million per year (2).

However, COVID-19 has caused a systemic shock to the tourism sector. A survey by the Kenyan government estimated a loss of US$ 750 million in tourism revenues and a reduction of almost 1.3 million jobs due to the pandemic. More than 81% of tourism companies have reduced staff and 85% have made pay cuts (3). The nature-based tourism sector has been hit hard by travel restrictions, with severe seismic repercussions for conservation and local livelihoods (see Figure 1).

**Innovation - what's being done to help with the recovery?**

As the coronavirus pandemic progressed, its transmission became better understood, and many countries introduced safety precautions to reduce the disease risk for visitors and hosts. New tools include the WTTC's SafeTravels standards and the Adventure Travel Trade Association's COVID-19 health and safety guidelines (5). Several countries and protected area authorities have produced information specifically for their visitors (for example, in Rwanda, South Africa) (6). A collation of this guidance developed under an EU project provides information for protected areas on operating tourism amid COVID-19 (7).

Tourism companies have needed to innovate rapidly to survive. Enterprises have diversified the types of visitor they cater to, their products and services, and their source markets to adjust to changing demand (8). Those that already had diverse products and services to offer have been more resilient as they have alternative income sources. Where tourism operations have farms or gardens on their properties, innovations have included expanding or diversifying production, and using produce to feed staff and their families. Also, virtual tours set up by protected areas and nature-based operators have received considerable traction and interest globally (9). While some of these are free for users, others are fee-based and can

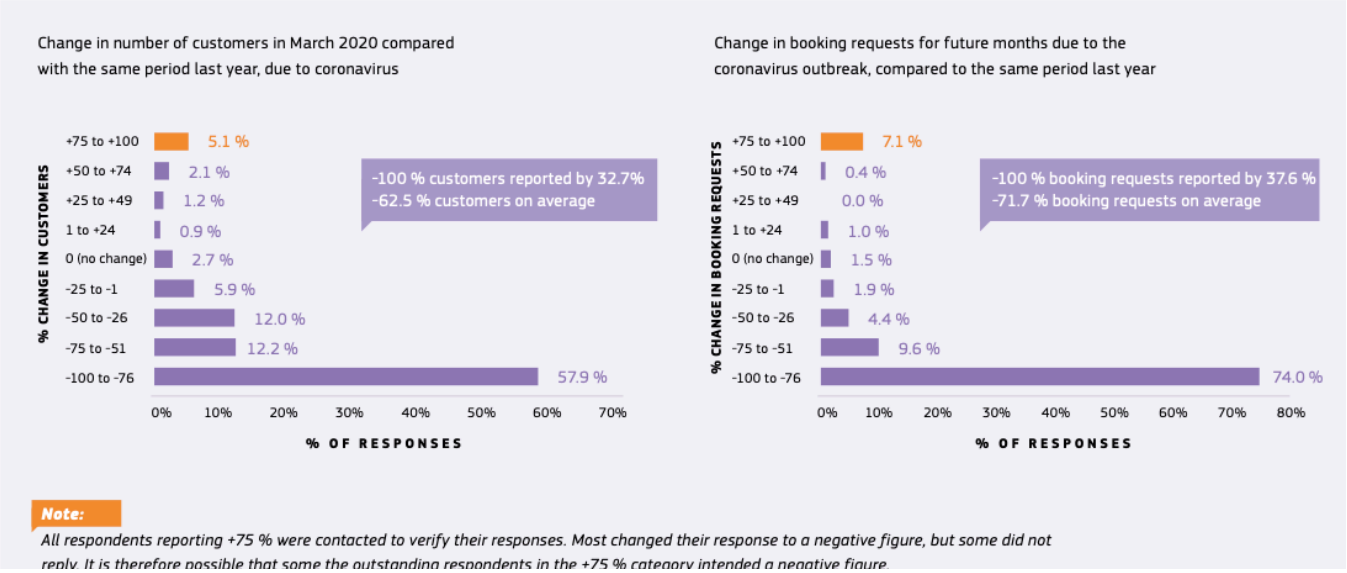


*Figure 1: Changes in percentage of customers and bookings due to COVID-19 among tourism operators in African protected areas (4).*

help offset losses in visitor revenue. Such virtual tours provide a way for people to experience natural attractions from their homes while inspiring future travel plans once restrictions are lifted.

**A sustainable future**

The pause in tourism has given many tourism and conservation professionals an opportunity to reflect on whether they want to go back to the way things were (10), or alternatively to 'build back better' and greener and recover in a more responsible, sustainable and regenerative way (11). The United Nations and international development agencies have been increasingly vocal in their support for sustainable recovery. In August 2020, UN Secretary-General António Guterres released a policy brief on COVID-19 and transforming tourism, stating that the tourism sector should be rebuilt in a way that is "safe, equitable and climate friendly [and as a] provider of decent jobs, stable incomes and the protection of our cultural and natural heritage." For travel and tourism to be truly sustainable, broad standards and protocols are needed to address climate change, conservation and social justice. It is also important to conserve nature in protected areas to avoid future zoonoses (12).

This is the time for the tourism sector to seize the moment and enact meaningful changes that will transform the world and make a lasting difference for future generations (13). COVID-19 has accelerated the sustainability agenda, and amid the pause, companies are concentrating efforts on their commercial survival. Many tourism operators see becoming sustainable as too hard to do, but in reality it is not so difficult. Resources like the new "Handbook for Sustainable Tourism Practitioners: The essential toolkit" (14) can help the sector to build back in a regenerative way, with communities at the centre.

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## "Friluftsliv" (outdoor life): Sustainability, trust and social inclusion

**Dag Terje Solvang**, Secretary General, The Norwegian Trekking Organization (DNT)

The Norwegian Trekking Association (DNT) aims to act as a responsible organization that carefully addresses key challenges for social and environmental sustainability in outdoor recreation though our strategic plan. This lecture will discuss and present approaches to key challenges for DNT and likely also for similar NGOs across the globe.

**Sustainability**

Principally, DNT view our activities as essentially sustainable, and a future low-emission society will require more outdoor life, not less. Still, overconsumption, climate change and degradation of valuable nature are the most severe challenges of our time. DNT's new sustainability strategy sets overall goals for our own operations and aims to make it easier to participate in nature- and climate-friendly outdoor life. By improving operations, we aim to inspire people to make more environmental-friendly choices in their everyday lives and push decision-makers in a sustainable direction.

**Trust and sharing economy**

A priority ambition is that DNT's cabin- and hiking route network must be Norway's most sustainable holiday and leisure offering. Maybe it already is, after all, DNT has been based on sharing economy principles for 150 years, long before the term was coined. Trust is a key concept of DNT. It is actually the foundation for the unique system of cabins and trails. As a member of DNT, you may borrow a DNT cabin key for a deposit of NOK 100. This key fits the locks in all the 450 self-service cabins. Upon arrival, you can serve yourself food and beverage, and pay afterwards. After trekking in Norway and experiencing how this system worked, former UN Secretary General Kofi Annan stated that ''this restores my faith in humanity!''.

However, Norwegians' total consumption is too high and is reflected in for instance the number of holiday airplane flights they take, and many have private cabins of a high standard, all of which have major impacts on the environment. It would have a positive effect if people were to choose short-distance trips and use DNT's cabins instead of flying abroad or acquiring their own cabins. DNT must maintain and further develop a cabin and route network based on a sharing economy, which will allow as many people as possible to enjoy the countryside in a sustainable way.

**Volunteering and inclusivity**

Outdoor life is an important arena for creating more inclusive societies, as well as contributing to good health and improved quality of life. DNT aims to create social meeting places that can work for everyone, and DNT is actively working to include new groups in outdoor life. This is challenging and we have a long way to go, since our operations and offerings must be inclusive for all ages and social groups and reflect current diversity in society. An important approach is to make outdoor life less expensive. To hire the equipment you need, buy secondhand and repair your own stuff are important measures both for the environment and for increased inclusivity. These offers must therefore be expanded.

**Use and protection**

For DNT it is also important to be a clear voice in favor of outdoor interests. Every year, important natural areas are lost to development. This also has an impact on people's ability to pursue an active outdoor life. DNT wants Norwegian nature to be both used and protected. We believe that the use of nature for simple and nature-friendly outdoor activities contributes to the enjoyment of nature and thereby to greater understanding of the need to protect it. DNT has a privileged role in the Norwegian society, since we have cabin operations in vulnerable and protected nature areas. This entails great responsibility. As an example; 80 % of all European wild reindeer lives in Norway. This means that Norway has a special responsibility to take care of and manage wild reindeer in a way that will allow future generations to experience viable populations of the species. We do hike in the same mountain areas, and must accept that outdoor life may have a negative effect on reindeer. DNT has and will continue to work with

conservation authorities to evaluate our cabins and trails network and have already relocated cabins and marked trails to reduce the conflict between wild reindeer and ourdoor recreation. This work will continue and be given even stronger emphasis in our new strategy, as human infrastructure and activity continue to put high pressure on vulnerable biodiversity.

**The right to roam**

Allemannsretten – the right to roam or the right of public access is an important element in Norwegian and Nordic outdoor culture and a part of our national identity. The right allows you to hike or put up your tent nearly anywhere you want. But now we see a challenge with few rules and regulations – and our right to roam is under threat from increased tourism. When too many people hike the same path or want to put up a tent on the same beach or urban forest, it becomes challenging. To find ways to protect ''Allemannsretten'' – and at the same time cope with increased numbers of hikers and campers in nature – will be an important issue for the next years.

**''Friluftsliv'' as an escape room**

How could ''friluftsliv'', our word for outdoor life, improve our lives even further? Facilitating outdoor life is documented as a good public health measure. The last year has been tough for many of us. News headlines like ''How 'friluftsliv' can help you through the pandemic'' have been seen all over the world during the last year. DNT conducted a poll in late 2020 and found that four out of 10 Norwegians said that the outdoors had become more important to them as a result of COVID-19. Many had re-discovered their nearest forest or urban beach. Local outdoor activities have always been important for DNT, and we must motivate as many of us as possible to use our local area for activities and outdoor life. Fuglemyrhytta, one of our most popular overnight cabins, is just two kilometers from the nearest tram station in Oslo. It has been booked every night through the pandemic. You can view the city skyline from the cabin – but still get a totally different feeling than from staying in your own home. We believe that to ensure and facilitate such offers, gives our members valuable experiences – and a better everyday life.

**About DNT**

Den Norske Turistforening DNT (The Norwegian Trekking Association) is Norway's largest outdoor recreation NGO. DNT has approximately 320,000 members and manages more than 500 cabins and 22,000 kilometers of waymarked trails across all of Norway, for use by its members, other inhabitants of Norway as well as foreign visitors.

## The need for Local Community Resilience in Sustainable Tourism

**Judy Kepher Gona**, founder of Sustainable Travel & Tourism Agenda-(STTA)

Tourism utilises substantial community assets and is to a large extent dependent on community willingness and acceptance of visitors. Community assets and community attitudes are therefore necessary for balanced growth, which is sustainable tourism. Whereas sustainable tourism is anchored on social, environmental and economic pillars, they are not stand-alone pillars. Environmental and economic pillars lean on the community pillar. In this context, community is broadened to include residents in destinations and all local providers of experiences in destinations. Sustainable tourism should focus on strategies to build resilience in order to strengthen environmental and economic pillars that support balanced growth.

# Poster sessions

| SESSION | PART | DATE | TIME | CHAIRS |
|---|---|---|---|---|
| Live Poster | I | Monday 16th August | 18.00 – 18.30 CET | Øystein Aas |
| Live Poster | II | Monday 16th August | 18.30 – 19.00 CET | Øystein Aas |

| | Programme |
|---|---|
| *Part I* | **95** In search of a human habitat: using machine learning to explore the role of landscape characteristics in human outdoor recreation |
| | **74** Visitors awareness and behavior regarding donations for Mount Ibuki conservation: A comparative study between climbers and car users |
| | **66** Risk communication as a measure to develop adventure tourism in Japan |
| | **45** Comparing participation in different invasive aquatic plant management programs among recreational users of freshwater lakes in southwest France |
| | **166** Recreational use vs nature protection in mountain protected areas - a case study of the Rax area, Vienna Alps, Austria |
| | **138** Management and restoration with visitors on Japan's Shikoku Pilgrimage paths |
| | **157** Do the participants truly prefer an outdoor education? - A study on indoor forest education online programs in the COVID-19 era |
| | **70** People engaging with biodiversity in urban parks: insights from citizen science and social media for birds |
| | **192** A new guideline: "Visitors count! Guidance for protected areas on the economic analysis of visitation" |
| | **171** Monitoring of tourist traffic during the SARS-CoV-19 pandemic in the Tatra National Park, Poland |
| *Part II* | **63** Quantifying nationality bias in data from different social media platforms for visitor monitoring in Nikko National Park, Japan |
| | **38** Did low-cost companies in the Azores provided an increase in the practice of recreational activities in nature? – Trail Running and Geocaching in São Miguel Island as a case-study |
| | **153** Tourist carrying capacity. A turning point to a sustainable tourism model. The case of Alt Pirineu National Park – Spain. |
| | **172** Sewage management in remote protected areas: high mountain challenge |
| | **111** Mountain huts as observatories of tourism transition |
| | **133** What do website review activities imply about natural park users? |
| | **80** Volunteer activities for semi-natural grassland conservation in Japan and the impact of COVID-19 on these activities |
| | **181** Estimating visit volume at the county level: An application of a variant form of the Lincoln Index method |
| | **169** Krka National Park's biodiversity as basis for wildlife tourism development |
| | **156** Publicly reported trail experiences: A mixed-methods dive into the internet corpus |

## 95 In search of a human habitat: using machine learning to explore the role of landscape characteristics in human outdoor recreation

**Carl Lehto**, **Marcus Hedblom**, **Erik Öckinger**, **Thomas Ranius**, Swedish University of Agricultural Sciences, Sweden

As the importance of outdoor recreation increasingly has been recognized due to its positive effect on human well-being and health there has been a renewed focus on how to ensure that the natural and cultural landscape can produce sufficient recreational opportunities. This is especially true in urban environments, where high land use pressure due to urbanisation often has lead to the loss of green space. To ensure that the managed landscape can supply recreational opportunities requires an understanding of what landscape characteristics (such as type and composition of land cover, topology and heterogeneity) are drivers of different kinds of outdoor recreation. Previous research in the field has to a large degree focused on establishing preferences of different kinds of environments e.g. by showing people photographs and asking questions (Gundersen and Frivold 2008); recently an increasing number of studies have been employing Public Participatory GIS-approaches to collect large amounts of data on human landscape usage (e.g Korpilo, Virtanen, and Lehvävirta (2017)). Still, most such studies are linked to specific areas (e.g. a single national park) or only looking at specific features (e.g. forest type, openness, heterogeneity).

In this study, we embraced the PPGIS approach on a large scale in order to explore the question of what landscape factors are most important for an area to be chosen for recreation. Employing a digital survey sent to a representative sample of residents of Sweden, 2856 respondents pinpointed the location of their latest outdoors recreational visit on a map and also provided details of the visit (such as type of activity, the time spent on location, distance travelled from home, etc.). Demographic information on the respondents were also collected. The data was initially analyzed in an exploratory manner, looking e.g. at the travel distances for different types of activites and which land cover types are selected for along the gradient between urban and rural areas using the Manly-chesson selection index.

The main analysis utilised machine learning in a used/available framework, where for each location used by a respondent a random location within that respondents travel distance was picked as a sample of what environment that person had available to them. For each location (both used and available) a number of map covariates were extracted from the surrounding area, e.g. land cover type, topology and presence of paths and roads. These map covariates were then used as predictors along with the demographic variables and the data on the recreational activities. Some variables were also combined to create new predictor variables, such as using reclassified land cover data to estimate landscape heterogeneity through the use of the Q index (Díaz-Varela, Roces-Díaz, and Álvarez-Álvarez 2016). Five different models were created looking at different scales of landscape.


Modelling was performed with boosted regression trees (BRT), a machine learning method of the gradient boosting class (Elith, Leathwick, and Hastie 2008). BRT have been shown to create models with high degrees of predictive power, and can handle any number of predictors and interactions between predictors. It is a powerful tool to explore large datasets, and especially useful in that you do not need to specify interactions a priori, nor is there a need for model selection processes. A weakness of the method is that the models can be harder to interpret than traditional regression models; resulting in 'black boxes' that are very good at predicting to new data but hard to understand. However, recent

advances in the field have yielded methods to increase the interpretability of these type of models (Molnar 2018).

To our surprise, all models performed poorly at distinguishing the used sample from the availability sample, with cross-validated AUC values between 0.54-0.567, meaning the models performed only slightly better than chance. This suggests that land cover type and composition, topology or other spatial factors were not influential in the choice of recreational area. Neither were any patterns found linked to demography (e.g. gender, age, education or living in urban or rural areas), implying that preferences are rather homogenous across the surveyed population. We argue that these results should not be interpreted to mean that the characteristics of the landscape does not matter for outdoor recreation, but instead that other factors (that were not included in our models) could be more important.

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# 74 Visitors awareness and behavior regarding donations for Mount Ibuki conservation: A comparative study between climbers and car users

**Takako Kohori**, **Kiyotatsu Yamamoto**, **Yuki Yamashima**, The University of Tokyo, Japan

**Introduction**

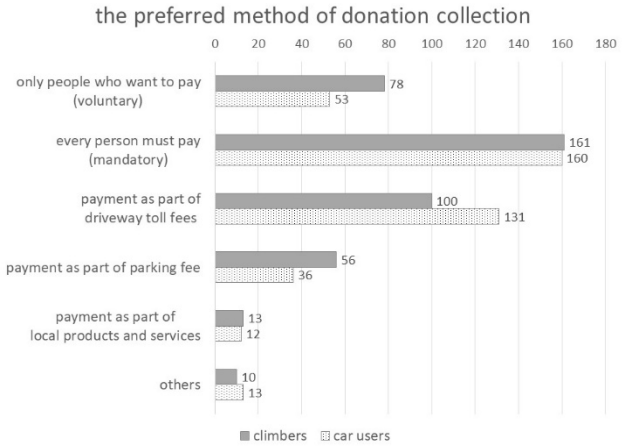
Resource managers seek to protect both visitor experiences as well as natural and cultural resources. There are three main categories of income for the management of conservation resources: societal taxes, toll road charges, and donations. However, donations are less contributive in most cases (Eagles, 2009). In Japan, there are a few compulsory collection systems, and most of them are based on voluntary donations. This study investigated the awareness and behavior of visitors with respect to donations for Mount Ibuki conservation and compared them between climbers and car users.

**Study area and methods**

Mount Ibuki is located in Biwako Quasi-National Park and has a wide variety of plants, including more than 1,300 endemic plant species. For this reason, the mountaintop grassland plant community has been designated as a Special Protection Zone of Lake Biwa Quasi-National Park and a Special Natural Monument of Cultural Property. There are two routes to the summit of Mount Ibuki. One is the mountain trail, and the other is the Ibukiyama-driveway, which opened in 1965.

In 2015, the Nature Restoration Council of Mount Ibuki, established mainly by Shiga Prefecture and Maibara City, introduced donations. The basic amount was set at JPY 300 per person and was collected voluntarily. The total amount of donations was approximately JPY 12 million in 2019. This money is used for vegetation recovery projects, trail maintenance, and cleaning activities. The method of collecting donations differs depending on the route. In the case of climbers, the local conservation group directly engages with visitors at the trailhead, seeking their cooperation. For car users, several unattended donation boxes and explanatory boards are used to collect the donations.

Questionnaire surveys were used to investigate visitors' attitudes on October 31 and November 1, 2020. The visitor was handed a questionnaire sheet and asked to mail them back after their hike. We distributed 1907 questionnaire sheets and received 536 responses (262 climbers and 274 car users). The questionnaire was designed to understand the attributes, awareness, and behavior of the visitors. Furthermore, to consider a fairer way for making donations, six options were set up: 1) only people who want to pay (voluntary), 2) every person must pay (mandatory), 3) payment as part of driveway toll fees, 4) payment as part of parking fee, 5) payment as part of local products and services, and 6) others.




**Results and discussion**

There was a difference between climbers and car users regarding whether they knew about the donation system before visiting Mount Ibuki. One hundred forty-three people (55% of climbers) had prior knowledge of the fees. However, only 37 car users (14% of car users) had prior knowledge of the fees. Furthermore, a difference was observed between the two groups with regards to payment of donations. Two hundred and eighteen people (83% of climbers) paid the donation, but only 81 people (30% of car users) made the payment. Of the 164 people who did not pay the car users donation, 127 people explained their reason for not doing so as "I did not notice the donation box for the fee"

Additionally, the results indicated the preferred method of donation collection. The option "every person must pay (mandatory)" was selected

by most climbers and car users. This implies that both visitors believe that donations should be more mandatory. The option of “only people who want to pay (voluntary)” was found to be the significantly popular choice among climbers ($P<0.05$), while “payment as part of driveway toll fees” was significantly higher among car users ($P<0.01$).

**Conclusion**

The study demonstrates differences in the knowledge and behavior pertaining to donation systems, between climbers and car users. Awareness of the purpose of the donation system, visibility of the collection site, and the act of encouraging or soliciting donations were identified as important factors (Yamamoto, 2017). In the case of the Mount Ibuki donation, it is posited that the low cooperation rate of car users may be the result of discreet collection sites and low awareness of the donation system. Meanwhile, we found that both visitors preferred fairer donation collections for all people, signifying the potential to build a more equitable collection method. By considering ways to financially support the system and protect the environment in collaboration with all visitors, the overall willingness to cooperate would increase, along with the sustainability efforts of conserving the mountain.

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## 66 Risk communication as a measure to develop adventure tourism in Japan

**Ayami Saga[1,2]**, **Tetsuya Aikoh[2]**, **Satoru Hayasaka[3]**, **Minoru Ito[4,5]**, [1]Hokkaido Development Engineering Center, Japan. [2]Hokkaido University, Japan. [3]Nomad, CO., Ltd., Japan. [4]Hokkaido Mountain Guide Association, Japan. [5]Nomad, Co., Ltd., Japan

**Introduction**

The global market for adventure tourism (AT) was steadily growing before the COVID-19 pandemic broke out in early 2020. The market is expected to recover most quickly in the tourism arena because AT is realized as small group tours in amidst nature. Adventure tourism was in fact introduced in Japan several years ago. This study introduces the reason that AT has not been included in commercial tourism and seeks a way to develop AT in Japan. To realize this, risk communication is examined through a case study that focuses on hiking.

Hiking is the most common AT activity worldwide. However, the number of licensed hiking exclusive tour companies in Japan is less than 15. Accordingly, while the annual number of domestic tourists is about 580 million (Japan Travel Agency 2020), the number of hikers who use tour companies are assumed to account for less than 0.1% of the total number of domestic tourists. Interestingly, the population who enjoy hiking privately numbers approximately 6.5 million (Japan Productivity Center 2017). These hikers have not been included in Japanese tourism. One of the possible reasons for this is that Japan's hiking roots lie in Shugendo, a religious belief that evolved during the 7$^{th}$ century as an amalgamation of animistic Shintoism and Buddhism. Commercial tourism seeks economic profits and a religion that weights spiritual values is incompatible. Another reason is that Asian tourists, including Japanese tourists, mainly focus on sightseeing, food, and bathing in hot springs. These tendencies are in contrast to those of Western tourists who prefer physical activities. Furthermore, Japanese tour companies tend to avoid AT tours that require risk control.

**Method**

The Japanese government is trying to increase the number of inbound travelers and their number has steadily increased from 8.36 million in 2012 to 31.8 million in 2019 (Japan Travel Agency 2020). To further increase this number, the large AT market offers enormous potential. Following the government's policy, the Hokkaido Tourism Organization has outsourced a project to the authors to develop AT tour programs targeting Daisetsuzan National Park, the largest national park in Japan. To achieve the aim of the project, eight AT experts were invited to familiarization tours (FAM) around the Daisetsuzan National Park. To produce attractive tour programs, the invitees were requested to evaluate Daisetsuzan National Park as an AT destination. Two FAM tours were planned. FAM-1 was a relatively hard four-day trekking tour traveling the Grand Traverse Course that extends about 70 km from the northern part of the park to its southern end. FAM-2 was a day tour of medium difficulty level. Four different invitees attended each of the FAMs. The invitees included two New Zealander adventure experts, an Italian FASI instructor, an Italian media/alpinist, French and Japanese AT tour operators, and two British writers. Experiencing the FAM tours, most of them found that the volcanic topography and vastness of Daisetsuzan National Park were unique and attractive enough to attract visitors from around the world.

A questionnaire survey was conducted targeting officers of municipal and national governments, members of tourism associations/DMOs, and private companies such as accommodations, cable cars, and guides. This was because the invitees' evaluations of Daisetsuzan National Park and accompanying guides were unexpectedly high. Some of the people aware of their evaluations might have changed their thoughts that hiking should not be included in tourism because they are overall risky. The questionnaire asked, "Should hiking be included in common tourism?" In total, 29 participants answered the questionnaire.

**Results**

Table 1 presents the results. Before FAM-1, the percentages of the responses that are positive to include hiking in common tourism are "Yes, when the risks

are minor" 55.2% and "Definitely, yes" 13.8%. After FAM-1, these percentages changed to 69.0% and 24.1%, respectively, producing a total of 93.1%. In FAM-2, before the tour, the percentages of positive opinions were 58.6% and 31%, respectively. After FAM-2, they changed to 72.4% and 27.6%, respectively, that is a total of 100%. After both FAM-1 and FAM-2, the stakeholders' opinions changed and they become supportive of including hiking in common tourism.

Table 1: Response to the inclusion of hiking in common tourism

| FAM 1 (Trekking) N=29 | Before (%) | After (%) |
|---|---|---|
| Should not be included | 6.9 | 0 |
| Undesirable | 13.8 | 6.9 |
| Neither | 10.3 | 0 |
| Yes, when the risk is minor | 55.2 | 69 |
| Definitely, yes | 13.8 | 24.1 |

| FAM 2 (Day hike) N=29 | Before (%) | After (%) |
|---|---|---|
| Should not be included | 3.4 | 0 |
| Undesirable | 3.4 | 0 |
| Neither | 3.4 | 0 |
| Yes, when the risk is minor | 58.6 | 72.4 |
| Definitely, yes | 31 | 27.6 |

**Discussion**

The respondents' behavioral changes identified from the questionnaire results were likely brought about by the information provided by the FAM attendees' evaluations. This process could be regarded as risk communication in which public and private stakeholders exchange information concerning risk and risk-related factors. In this project, the FAM attendees' feedback included risk factors, such as hiking trail and sign deterioration, in addition to their positive evaluations. Through this information, the stakeholders were supposed to specifically know about hiking risks and provide suggestions to lower the risks. In other words, the information lowered their risk perception of hiking. The decrease in the risk perception level also coincides with the fact that the public is willing to accept "voluntary" risks roughly 1000 times greater than "involuntary" risks (Starr C. 1969). Usually the "voluntary" risk taker is the actor himself or herself, however here the stakeholders who responded to the questionnaire could also be regarded as voluntary risk takers because they might be affected adversely by hiking accidents while they could control the risks by improving trails and offering safety information. The respondents' behavioral changes are also assumed to be affected by the FAM attendees' high evaluations of Daisetsuzan National Park because Starr points out that social acceptance of risk is directly influenced by public awareness of the benefits of an activity. In this case, the expected benefits are those realized through AT development.

**Conclusion**

Hiking has not been included in common tourism in Japan thus far, and therefore comprehensive hiking risk management has not been realized by relevant stakeholders. Even though the amount of the information that was conveyed to the stakeholders in this project was scant, the results suggested that the potential of risk communication as a measure for including hiking in common tourism in Japan.

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## 45 Comparing participation in different invasive aquatic plant management programs among recreational users of freshwater lakes in southwest France

**Jeoffrey Dehez**, **Sandrine Lyser**, INRAE, France

Alien species can have major ecological and socioeconomic impacts and so effective management are needed. In this perspective, one increasingly seeks to involve end users, such a recreational users (Shackleton, Adriaens et al. 2019). Recreational users may share valuable knowledge about the ecological ecosystems at stake. They have time, materials and money to afford. In the literature, several studies have looked at factors that increase user involvement highlighting the effect of variables such as e.g. perceptions, information, or education. Nevertheless, these behaviors are often studied separately or, conversely, grouped into a single category called “pro-environmental behaviors” (Halpenny 2010). Without excluding the possibility of common factors affecting these behaviors, we consider that behaviors are not necessarily homogeneous. In particular, the nature of the operations to be carried out may be very important (Niemiec, Ardoin et al. 2017, Pagès, Fischer et al. 2019). This is what we study in detail in this paper.

To do so, we conducted an on-site quantitative survey of 323 recreational users on the freshwater lake of Aureilhan (340 Ha), in Southwestern France. The lake is used for many leisure activities with, in particular, two beaches, fishing trails, hunting grounds, boat slips and rings, a sailing club and a nautical stopover. It is invaded by several invasive aquatic plants, including Ludwigia peploïdes, Lagarosiphon major, and Myriophyllum brasiliense. Management programs for these invasive plants have been applied for several decades

The surveys took place during 3 months in the summer of 2019. To improve the representativeness of the sample, quotas were defined on the geographical origin of the visitors, the sites of practices and the months of the year. In addition to individual information, visitors were asked questions on topics such as their knowledge, perceptions, attitudes towards invasive aquatic plants, their attachment to the lake, and their recreational uses. The three plants listed above were not described as invasive at the beginning of the survey so as not to bias the individual responses. Five modalities of participation in the management were proposed: changing one's uses on the lake, talking about the plants around one, participating in a digging up, transmitting information to a participative observatory, contributing financially. Three answers were possible: "yes", "no", "I already do it". This design allowed us to compare reported behaviors with intentional behaviors. We conducted bivariate and multivariate statistical analysis (multinomial regressions).

First, our work confirms the influence of recreational practices on the nature of perceptions. For example, anglers are more likely to report that plants can provide positive shelter for fish ($p<0,05$) and swimmers are more likely to report that plants can increase the risk of drowning ($p<0,001$), although there is no scientific evidence for either at this time. This directly affects the willingness to participate by following. Overall, 94.69% of respondents said they were willing to participate in one way or another. However, the rates of support vary greatly depending on the proposed operations, with a minimum of 16.72% for the financial contribution and a maximum of 79.54% for the change of uses on the lake. As noted in other works, the supply of financial resources is less important than the supply of time.

The various dimensions of place attachment have different influences on willingness to participate, depending on whether we are looking at reported behaviors or behavioral intentions. Overall, utilitarian values and overall environmental values have a stronger influence on willingness to participate than local place identity variables.

Personal knowledge is another important variable. On this point, tourists and residents differ strongly. While residents appear to be more aware of the problem of invasive aquatic plants, relying on their own networks ($p<0,001$), this is not an explicit reason for tourists to refuse. The first reason for refusal among tourists is "not to live there"($p<0,01$). Fewer tourists than residents feel they do not have the time ($p<0,01$), financial means ($p<0,01$) or equipements to do so ($p<0,05$).

In conclusion, our work confirms that recreational users are highly sensitive to the nature of operations before participating in a management program. Often considered as a homogeneous group in invasion science literature, recreational users show very different behaviors and positions. The relationship that these actors have with the natural environment is far from neutral. It will strongly condition the type of measure that can be applied. This point is still too often neglected by managers in charge of biological invasions. It is however a crucial element to improve the efficiency and organization of volunteer campaigns in the future.

# 166 Recreational use vs nature protection in mountain protected areas - a case study of the Rax area, Vienna Alps, Austria

**Kerstin Radakovitz**, **Karolina Taczanowska**, **Christiane Brandenburg**, University of Natural Resources and Life Sciences, Vienna, Austria

**Introduction**

The Rax mountain is a popular leisure and recreation area in the eastern part of Austria. In this region mountaineering has a long tradition and the area is used by a lot of visitors for different kinds of leisure time activities during the summer and winter months. The Rax mountain not only has a particular importance to leisure and recreation, due to the advantageous geological conditions it belongs to the watershed of the First Vienna Spring Water Main and therefore the Rax is declared as a water protection area. To enable the interests of leisure and nature conservation equally as well as to ensure the high grade of water quality, profound knowledge of visitors sociodemographic structures, individual behavior and the spatial distribution is crucial.

**Study objectives & methods**

This study focuses upon a written survey among the visitors of the Rax region (n=1010) with regard to their visiting and activity motives, the preferred starting points and hiking routes . Furthermore, the planned length of stay, the group size, the state of knowledge of the participants about the research area as well as generally valid commandments and prohibitions are determined. Considering the origin of the visitors, parking counts are carried out in addition to the questionnaire at prominent starting points. On the basis of GIS-assisted route analysis highly frequented hiking trails are illustrated which in turn provides information about the preferences of the visitors with regard to the choice of the starting point or the degree of difficulty of the route.

**Selected results**

The results indicate to high priorities in hiking and enjoying nature. The majority of respondents are very satisfied with the Rax leisure and recreation area and more mostly familiar with the behavior in protected natural areas and the water protection area. In the vicinity of two main starting points are heavily frequented hiking trails.

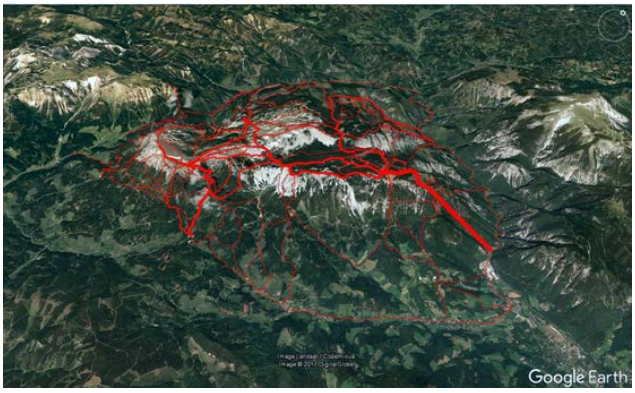


Figure 1. Spatial distribution of visitor flows in the Rax area, Vienna Alps, Austria. GIS-based analysis of trip diaries collected during on-site interview.

**Conclusions**

The study contributes to the ongoing discussion on the management of visitor flows in protected areas as well as current preparedness planning based upon social distancing in the conjested outdoor recreation destinations, especially those using climing aid, such as lifts and cable cars.

## 138 Management and restoration with visitors on Japan's Shikoku Pilgrimage paths

**Kazuya Kurita**[1], **Shusaku Kojima**[2], [1]Tokyo University of Agriculture, Japan. [2]Mets Research & Planning, Japan

Management and conservation of Japan's Shikoku Pilgrimage paths is getting more important in order to restore its historical way of pilgrim on foot as well as the new way of pilgrimage by car or bicycle. Authors investigated the present situation of 1,200km-long pilgrimage with 88 temples in Shikoku Island passing through several national parks and protected areas, which is proposed to be listed as an UNESCO World Heritage (cultural heritage) site.

## 157 Do the participants truly prefer an outdoor education? - A study on indoor forest education online programs in the COVID-19 era

**Jin-woo Kim**, **Ju-Hyoung Lee**, Department of Forest Resources, Yeungnam University, Korea, Republic of

'COVID-19 pandemic' and the 'Social distancing,' there have been inevitable changes in Korea's Forest education program that usually provided face-to-face interaction. Therefore, this study aimed to investigate the changes in forest education programs during COVID-19 and determine the effectiveness of forest services in the online communication environment, which have not been experienced before. The real-time 2 hours online programs were developed and implemented by nationally certified 30 forest education experts from August 8 to October 31, 2020. Program participants communicated with forest education experts through online screens and chats, and 4202 people in total participated in 100 different programs were surveyed and analyzed. Participants could join in the broadcast with the link sent by the project institute. The programs were classified totally by educational method(Figure 1a), topic(Figure 1b), environmental characteristics of the venue, and geographic location. The forest education experts' behavior and participants' responses were followed up simultaneously, and the satisfaction levels were analyzed after completion of the programs. According to the study, three types of the method by only voice(58.0%), alone(12.0%), more than one person(30.0%) showed up. With regard to the topic of program development, mainly included somewhat passive programs such as walking(37.6%) and eco-crafts(20.5%). Parks(31.2%) and forests(28.6%) were preferred as venues, and the majority of the programs were conducted at the outskirts of cities(62.9%). The interview for the satisfaction revealed that the forest interpreters were dissatisfied with dealing with excessive amounts of the program running time for 2 hours. The participants were not happy with the quality of the broadcast's image, and the project institute experienced technical issues with the transmission of the broadcast network. However, under the limited conditions because of the COVID-19, the participants were able to experience the natural scenery, and the forest interpreters had the opportunity to proceed online programs were answered positively. In conclusion, the capabilities of forest interpreters and types of program content provided in the offline era have evolved to provide high-quality video and broadcast content in the current era of online communication. It was concluded that changes are essential to meet the increased demand for online forest education programs. Further research in on-line forest programs should develop and confirm these initial findings by revealing the effectiveness of each programs.

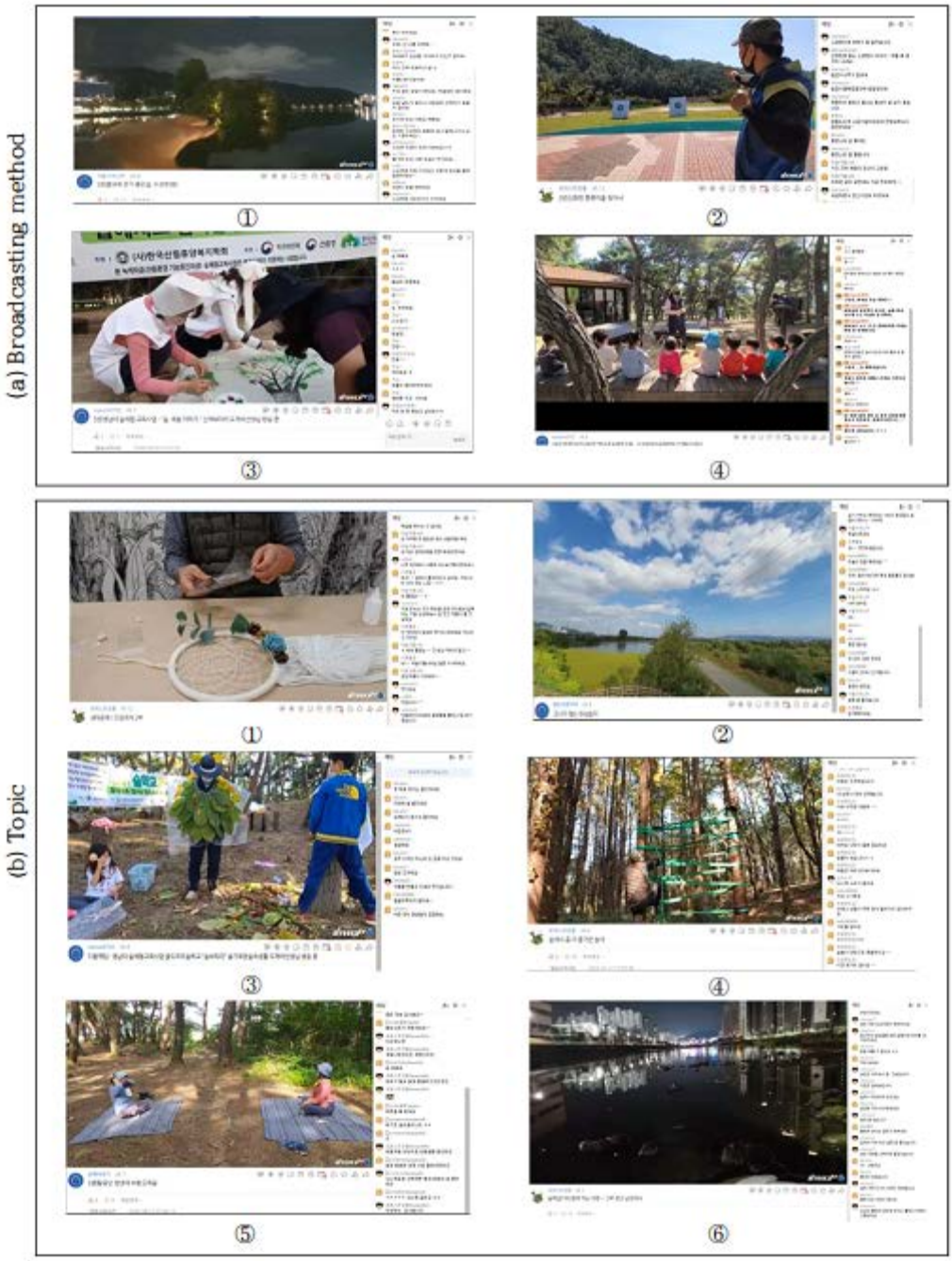


**Figure 1. Categorized screenshots of each characters (a) Broadcasting method ① The forest interpreter doesn't appear and only explain ② The forest interpreter appears alone ③ More than two forest interpreter appears (b) Topic ① Eco-craft ② Walking(including hiking) ③ Play(using natural objects) ④ Play(using professional props) ⑤ Relaxation ⑥ Nightsight**

# 70 People engaging with biodiversity in urban parks: insights from citizen science and social media for birds

**Joel Irwin**, **Clare Morrison**, **Guy Castley**, **Catherine Pickering**, Griffith University, Australia

## Introduction

Bird watching, or avitourism, is both a highly popular form of nature-based tourism as well as a recreation activity undertaken by hundreds of thousands of people, including in Australia (Lopez et al., 2020; Steven et al., 2015). Many people engaging in bird watching do so in their local area, and as a result bird watching is a popular pastime in many urban parks and other green spaces in cities. These often smaller and fragmented spaces are (i) easy to access and popular places for people to visit regularly, and (ii) able to support relatively high levels of biodiversity in otherwise low diversity urban landscapes (Catterall et al., 2010). Monitoring where people engage with nature in cities including bird watching can be challenging due to the diversity of locations and multiple ways people access and traverse them. Surveys and other methods have been used to assess the popularity of bird watching and other activities in urban parks and more broadly (Pickering et al., 2020). Recently researchers have started to utilize citizen science and social media records of birds as a way to assess where people engage with nature including in cities (Lopez et al., 2020). Here we compare two sources of data – the popular citizen science app/website iNaturalist, and images posted to the social media platform Flickr to assess how such data could be used to understand where people are bird watching. We use the large subtropical city of Brisbane, Australia as a case study as it contains high bird diversity, many urban parks, bird watching is popular (Catterall et al., 2010) and there are hundreds of geolocated records associated with images of birds available on the two platforms for the city.

## Methods

Brisbane is the capital of Queensland and is located in the south-eastern corner of the state (Figure 1). It is the third largest Australian city with an estimated population of 2.3 million in the Greater Brisbane area in 2020 (Queensland Government, 2021).

A total of 24,415 records of birds posted by 1,212 users were downloaded from the iNaturalist website for the Brisbane City Council Area. For Flickr, the Application Programming Interface **(**https://www.flickr.com/services/api**)** was used to download metadata of images using the terms "Brisbane" "birds" in tags, titles or descriptions resulting in 19,597 images from 2,451 users. For both iNaturalist and Flickr, geolocated records from outside the Brisbane City Council Area were removed from the datasets. To avoid biases associated with intensive posting by some users, we randomly selected one record per user per month from each dataset. The Flickr images were also manually screened to remove those not showing birds. The remaining records in both datasets were then overlayed in QGIS on a layer showing all urban parks and natural vegetation in the City Council Area.

## Results

There was a total of 3,032 records of birds across Brisbane, with far more records and users on iNaturalist (2,405 records, 79%, 903 users) than Flickr (627 records, 21%, 315 users). Although records covered many areas of Brisbane, there were distinct clusters of bird watching in parks as well as the city centre. Overall, 36% of records were in parks and posted by 574 users. The proportion of records from parks was the same for both datasets (Chi-Squared test, p = 0.8713).

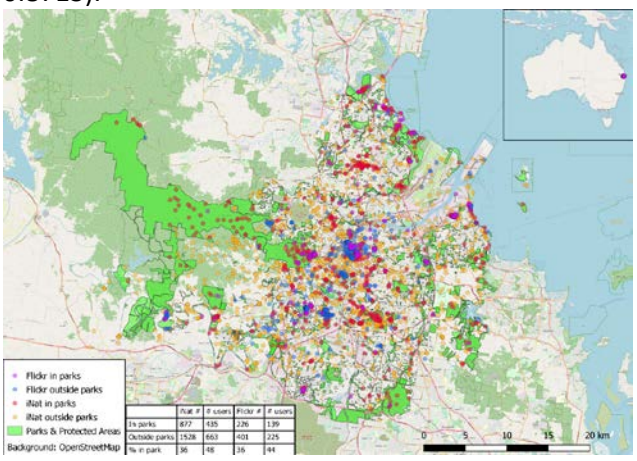


*Figure 1: Location of iNaturalist records and Flickr images of birds inside and outside parks and protected areas in the Brisbane City Council area.*

**Discussion**

Bird watching is popular and people often share their experiences via citizen science projects and on social media, with around 1,400 people recoding encounters with birds in Brisbane across the two datasets analysed here. Although much of the engagement occurred within urban parks, far more records were from other parts of the city, highlighting how they can also be important places for bird watching and engaging with nature. This differs to the study by Lopez et al. (2020) in Chicago that found over half of bird sightings were in greenspaces. The data will now be used to look at (i) which bird species people engage with, (ii) what traits of those species may account for their popularity, (iii) when people engaged with them, and (iv) detailed hotspot mapping of the current records by adding in other data sources.

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# 192 A new guideline: "Visitors count! Guidance for protected areas on the economic analysis of visitation"

**Jan Philipp Schägner[1], Anna Spenceley[2], Barabara Engels[3], Manuel Engelbauer[4], Joel Erkkonen[5], Hubert Job[6], Liisa Kajala[5], Lisa Majewski[6], Daniel Metzler[7], Marius Mayer[8], Andrew Rylance[9], Niklas Scheder[6], Cecilie Smith-Christensen[10], Thiago Beraldo Souza[11], Catherine Cullinane Thomas[12], Manuel Woltering[6]**, [1]European Commission, JRC, Italy. [2]IUCN TAPAS, Papua New Guinea. [3]BfN, Germany. [4]Frankfurt Zoological Society, Germany. [5]Metsähallitus, Finland. [6]University of Würzburg, Germany. [7]n.s., Germany. [8]Universität Greifswald, Germany. [9]University of Johannesburg, South Africa. [10]World Heritage Catalysis, Norway. [11]CMBio, Brazil. [12]USGS, USA

**Introduction**

This paper introduces a guideline: "Visitors count! Guidance for protected areas on the economic analysis of visitation"[i] published by by German Federal Agency for Nature Conservation (BfN) and UNESCO. The guideline aims at providing all knowledge needed for measuring economic impacts of tourism in protected areas (PA). The objectives are to provide essential knowledge about:

- How to evaluate economic effects of tourism in PAs;
- How to do visitor counting;
- How to do visitor surveys;
- How economic analysis works, and how to do it;
- How to best report and communicate findings and
- How to use findings for establishing sustainable PA tourism management strategies.

The guideline targets PA managers, their respective natural and cultural heritage agencies, practitioners, academia, consultancies, international stakeholders and donor agencies. It is currently translated into a Massive Open Online Course (MOOC). Within a series of online webinars over several months participants will acquire all relevant knowledge to conduct PA tourism economic impact assessment and a successful final exam will be certified.

Why to assess PA tourism's economic impacts?

The establishment of PA is a widely accepted tool for biological conservation[ii] and globally their number has 15-fold since 1960.[iii] Typically, PAs are primarily dedicated to the protection of natural and cultural heritage and the conservation of biodiversity.[iv] Nevertheless, often such nature conservation goals conflict with the economic interests of local communities and governments, which may burden PA management costs and the limitations in economic activities within the area (such as agriculture, property development, extractive industries etc.). Consequently, PAs are often confronted with limited acceptance, resistance, and violations by part of the society.

However, the economic contribution of PA tourism can support the economies of local communities by providing employment and income opportunities and by contributing to the sustainable finance of PAs. Worldwide, PAs are estimated to receive about 8 billion visits per year, which generate approximately USD 600 billion in direct in-country expenditure.[v] Well managed tourism in PAs has the potential to generate tangible mutual benefits as it can increase PAs' acceptance and reduce the dependence of local communities on other economic activities, which conflicts with PA's nature conservation goals. Therefore, making the economic benefits of PA tourism explicit can help advocate for enhanced public, political and financial commitments for PAs by showcasing that PA may often generate economic benefits exceeding their costs.

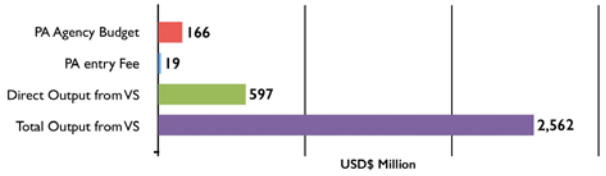



*Figure 1: Economic assessment of visitor spending in protected areas of Brazil (USD million)*

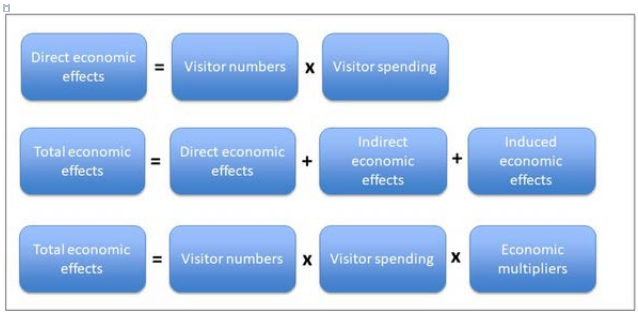
As we can only manage what we can measure, the evaluation of these economic impacts is increasingly needed to develop sustainable PA tourism strategies and to justify protection considering other competing land use options.

How to assess PA tourism economic impacts?

During a trip to a PA visitors spend money on entrance fees, accommodation, souvenirs etc. This money causes a range of economic effects, so-called:

- direct economic effects,
- indirect economic effects and
- induced economic effects.

Multiplying the number of visitors with their mean visitor spending results in the so-called direct economic effects. Indirect economic effects emerge from the purchase of input goods from a business selling directly to the visitors and induced economic effects result from increased demand within the region due to extra income generated by the PA tourism sector. Indirect and induced economic effects are calculated by multiplying the direct economic effects with specific economic multipliers.




*Figur2: From visitor numbers, visitor spending and economic multipliers to total economic effects.*

Estimated economic impacts used to improve policy and management decisions. To maximize PA tourism economic impacts, visitors need to (1) come, (2) stay, (3) spend money and (4) the money needs to circulate within the local economy. However, potential adverse social and environmental side effects need be considered when developing a PA tourism strategy to ensure a sustainable development.

The guideline provides all knowledge needed to collect and combine the required data in and cost-effective and efficient way and how to translated into improved management decisions.

Conclusion

PA tourism can have a significant economic impact on local economies. Their assessments can support the development of sustainable PA tourism strategies while increasing the acceptance of PAs within local societies by making these impacts explicit. Therefore, we provide guidance on how to estimate the economic impacts of PA tourism.

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# 171 Monitoring of tourist traffic during the SARS-CoV-19 pandemic in the Tatra National Park, Poland

**Magdalena Sitarz**, **Maria Król**, **Paweł Kauzal**, Tatra National Park, Poland

## Introduction

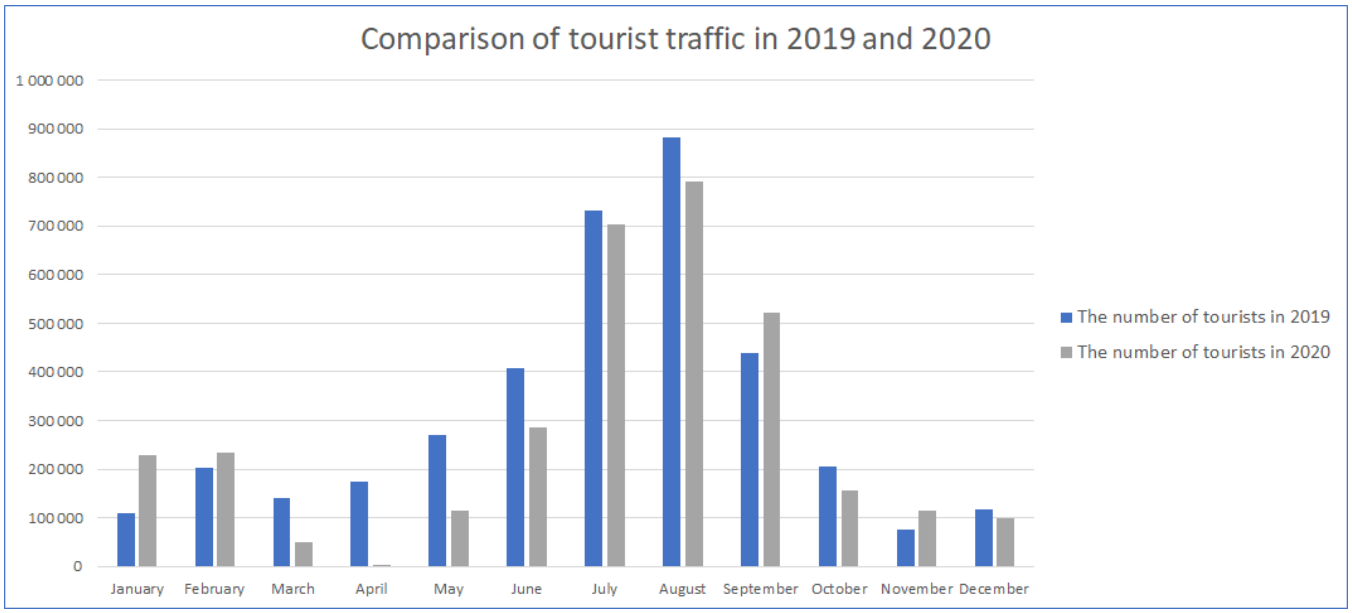
The Tatra National Park is the fifth largest national park in Poland with the area of 211 km$^2$. Any kind of human activities is limited to the 275 km of tourist trails and specially designed areas for hiking, skiing or climbing. Over the years the total number of tourist visiting the park has been gradually growing. However in 2020 with the outbreak of the Sars-CoV-2 pandemic it might seemed that the total number of tourists could decrease due to the temporary restrictions of traveling to the other cities and closure of hotels, guesthouses and restaurants. The borders were also temporary closed. For short period of time even the Tatra National Park was closed, at the beginning only for tourists outside Zakopane and surrounding villages but later also for local residents. The aim of this research is to present the observation of tourist traffic in 2020 during the Sars-CoV-2 pandemic and comparison to the year 2019.

## Methods

In the Tatra National Park information about the tourist traffic are mainly obtain both from tickets sold in ticket selling points situated at the entrance to the valleys and tickets sold online. However during the lockdown in March and April of 2020 tickets were not sold because park was open just for the citizens of Zakopane and the surrounding villages who are exempt from park entrance fees. This is why for that period the amount of local residents visiting Tatra National Park was assumed by the park rangers. For short period of time the area of TNP was closed also for local residents without exceptions and tourist traffic has been entirely ceased. When the restrictions were eased, four small valleys have been opened for both tourists and locals. In two of them (Białego and Strążyska Valleys) the number of tourists was obtained from ticket points, while from Ku Dziurze and Za Bramką Valley from installed camera traps. During the lockdown also information about the illegal human activities were monitored by means of camera traps. In addition to that, for the whole year camera traps were installed in different time and locations to assess the number of illegal human activities.

## Results

Data obtained from sold tickets in 2020 showed that the total number of tourist was only a slightly lower than in 2019 - 3 301 895 and 3 758 131, respectively.



Closed ski slopes almost all winter have made ski touring an increasingly popular winter sport. This is why despite of the short winter season the total number of ski tourists in 2019 and 2020 was quite similar - 10545 and 9002, respectively. Significantly smaller amount of tourist was observed from 13 of March till 2 April of 2020 when TNP was open only for citizens of Zakopane and surrounding villages. The number of hikers was about 6280 and ski tourists - 2074. To compare, the number of tourists in 2019 was much higher 99 587, but the number of ski tourists was quite similar - 3 365. From 3 to 21 of April Tatra National Park was closed for all without exceptions.

Since 22 of April till 3 of May 2020, when the restrictions were eased four small valleys were opened for both local residents and tourists. The amount of tourists from two valleys was gathered from ticket points: Białego Valley - 1 592 (comparing to 3405 in 2019), Strążyska Valley – 2 839 (comparing to 9720 in 2019). In two valleys without ticket points, camera traps were installed and following numbers of tourists were observed: Ku Dziurze Valley – 2256, Za Bramką Valley – 1759. Additionally, 9 camera traps were installed from 3 of April to 3 of May to monitor the number of visitors on temporary closed tourist trails in different locations around the park. During that time 862 people were observed. In the spring months, the significant difference in visitor numbers was due to government restrictions on education. May and June are the months most often chosen for school trips. Morskie Oko Lake and Kościeliska Valley are then besieged by school groups every year. There were no school trips in 2020, which resulted in fewer number of tourists. In May 2019, 53 482 tourists visited Kościeliska Valley, and in 2020 four times less – 11 442. A similar situation took place at the ticket point at Palenica Białczańska (entrance point for trail leading to Morskie Oko Lake), where these numbers were as follows: May 2019 - 71 297, May 2020 - 22 643. In June 2020 in these two locations there were over 63 000 tourists less than in 2019.

The highest number of tourists in 2020 was observed in winter months - January and February - 462 585 and in summer months - from June to September - 2 303 331. In the 2019 at the same periods of time the number of tourists was 312 216 and 2 460 867, respectively. Not only the total number of visitors in 2020 was high but also the number of illegal human activities was enormous and reached 4833 people (which was almost three times more than in 2019).

**Conclusions**

Despite the Sars-CoV-2 pandemic outbreak in 2020, the total number of tourist was only 456 236 less than in 2019. The reason for this situation might be temporary closure of borders which encouraged tourist to more willingly choosing Tatra National Park as a holiday destination. In 2020 only in those months when restrictions were announced and the area of TNP was temporary closed, the number of tourist was much smaller than in 2019. When in comes to other months, this number was quite similar, especially in the summer months. An extremely negative phenomena observed in 2020 was the number of illegal human activities almost three times higher than in 2019. It was especially noticeable in the winter, when ski tourists activities were observed in many places out of the marked trails. To sum up, despite the outbreak of the Sars-CoV-2 pandemic in 2020, Tatra National Park was eagerly visited by tourist.

# 63 Quantifying nationality bias in data from different social media platforms for visitor monitoring in Nikko National Park, Japan

**Masahiro Kajikawa[1], Takafumi Miyasaka[1], Yutaka Kubota[1], Akihiro Oba[2], Katori Miyasaka[3]**
[1]Graduate School of Environmental Studies, Nagoya University, Japan. [2]Research and Development, Initiative, Chuo University, Japan. [3]College of Bioresource Sciences, Nihon University, Japan

**Introduction**

Nature-based tourism in protected areas has grown worldwide in recent years, but excessive use of natural areas can result in their degradation or loss. Visitor management should be based on proper monitoring data to achieve quality experiences for visitors without damaging nature resources.

Visitor data are typically collected through field surveys, but budget and human resource constraints can limit the spatio-temporal resolution of survey data. Geotagged photos and messages posted on social media by visitors have attracted attention as useful sources of information with high spatio-temporal resolution. Previous studies, however, have raised concerns that biases in social media data arising from the sociodemographic attributes of posters can create challenges in determining who and what the social media data represent, and in interpreting this data in a reliable way.

The present study focused on nationality bias, i.e., differences between the nationality of actual visitors versus the nationality of those visitors who post on social media. Nationality bias can arise due to significant differences in the use of social media from country to country (including the proportion of the population using social media). Cultural and values differences between countries can also greatly influence visitor behavior, and these gaps may lead to over- or under-estimation of visitors from specific countries or regions. However, nationality bias is not fully understood because few studies have explicitly considered it until now (e.g., Heikinheimo et al., 2017; Sinclair et al., 2020). In addition, the previous studies were confined to protected areas where the majority of visitors were from Europe.

This study examined one protected area in Japan to which many of the foreign visitors come from Asia. Our objectives were to quantify nationality bias in visitor-generated social media data in order to improve general understanding of this issue, and to examine the feasibility of using social media for visitor monitoring and management in protected areas.

**Methods**

The study area was the Oku-Nikko area of Nikko National Park, one of Japan's most popular national parks. In October 2019, we conducted a questionnaire survey in four locations with different levels of popularity and different characteristics, to cover a diverse range of visitors to the area. Questions covered the nationality of visitors, and their usage of social media, including what social media platforms they used, whether they usually shared their travel experiences on social media, and whether they usually geotagged their posts. We also investigated other basic visitor attributes and behavior, including gender, age, size of party, means of transportation, length of stay, and places visited within the Oku-Nikko area.

When conducting surveys at multiple locations, sampling should be done according to the spatial distribution of the number of actual visitors at those locations, to avoid over- or under-estimating characteristics of some locations. Since such detailed reference visitor data as the number of visitors in different segments of a natural area are generally not available, we collected geotagged tweets posted around the four sampling locations in October 2019. We then estimated the relative ratio of actual visitor numbers at the locations using two parameters: the number of visitors who actually posted geotagged tweets (on Twitter) around each of the locations, and the percentage of respondents who answered they would post their travel experiences with geotags (on Twitter) at each location in our survey. According to the relative ratio, we performed a resampling of the dataset we collected in the field (n = 1185) and built a new dataset (n = 552).

To simplify analysis and interpretation of results, we considered social media posters to be only those visitors who used Twitter, Instagram, or

Facebook platforms. For the same reasons, we classified nationalities into Japan, Asia (excluding Japan), and other countries (88.0% of which were composed of Europe and North America).

First, we compared visitor attributes (except nationality) and behaviors between different nationalities of visitors, and between all visitors and social media posters among them, in order to characterize these different groups. Then, we analyzed whether the ratio of visitors posting on social media to all visitors differed by nationality, to test for nationality bias in social media data.

**Results & Discussion**

We found that visitors posting on Instagram and Facebook and visitors from Asia and other countries generally had similar patterns of visitor attributes, except group size. The foreign visitors, particularly Asian visitors, also had similar patterns of visiting places compared to visitors posting on the two platforms. These attribute and behavior patterns were different from the patterns of all visitors, most of whom were Japanese (87.5%). For example, foreign visitors were younger, the group size of Asian visitors tended to be larger; the group size of visitors from other countries tended to be smaller, most foreign visitors tended to be first-time visitors, and foreign visitors tended to visit high-accessibility places. In addition, the percentages of Instagram and Facebook posters were much higher for Asian visitors and lower for Japanese visitors, compared to all visitors. These results indicated that foreign visitors had different characteristics from all visitors or Japanese visitors and would be overestimated in Instagram and Facebook data. On the other hand, visitors posting on Twitter did not significantly differ in visitor attributes or behaviors from all visitors, except in terms of age. This could be explained by the fact that Twitter was a more popular platform for Japanese than Instagram and Facebook, which is the opposite of the international trend. The result suggests that in Japan Twitter would be more representative of all visitors in the areas where most of the visitors are domestic (Japanese).

Our findings would vary depending on the status of use of social media, which can differ from country to country. Further studies are needed to elucidate nationality bias in different countries and to improve the feasibility of using social media to understand visitor to protected areas.

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# 38 Did low-cost companies in the Azores provided an increase in the practice of recreational activities in nature? – Trail Running and Geocaching in São Miguel Island as a case-study

**Pedro Gomes[1,2], Mónica Moura[1,2], Ricardo Nogueira Mendes[3,4], Maria Anunciação Ventura[1,2,]** [1]CIBIO, Centro de Investigação em Biodiversidade e Recursos Genéticos, InBIO Laboratório Associado, Pólo dos Açores, Portugal. [2]Faculdade de Ciências e Tecnologia da Universidade dos Açores, 9501-801 Ponta Delgada, Portugal. [3]PhD Candidate / Investigador Colaborador. GISEAFE - Grupo de Investigación Social y Educativa de la Actividad Física y del Deporte. Institut Nacional d'Educació Física de Catalunya. INEFC - Universiat de Lleida, Spain. [4]CICS.NOVA, Centro Interdisciplinar de Ciências Sociais Faculdade de Ciências Sociais e Humanas – NOVA FCSH. Av. de Berna, 26 C, 1069-061 Lisboa, Portugal

**Introduction**

Natural landscapes are among the greatest tourist attractions all over the world. Nature is a way to regain energies from the stress experienced in urban areas. In the Azores archipelago, the nature-based tourism is one of the main touristic products of the islands, according to the Strategic and Marketing Plan for Tourism in the Azores. The liberalization of the Azorean airspace in 2015 to low-cost airlines, helped to boost the tourism industry in the archipelago, with a focus on nature-based activities such as nature sports and adventure events (e.g. MTB and Trail Running epic races). Other landscape outdoor activities such as Geocaching have also developed, the latter reaching about 2000 geocaches placed in many touristic locations of the islands.

Here we analyzed two nature sports, Trail Running, a pedestrian run performed on trails in natural areas, with one of the essential elements of this race being the practitioners' approach to nature; and Geocaching, which is a treasure hunt of modern times, practiced all over the world, where all it takes is a spirit of adventure and equipment with a GPS receiver, using the coordinates to provide hidden containers (geocaches) and share the experience of your online adventure.[2]

Having low-cost airlines flying to the archipelago, has led to an increase in the number of visitants; this is in turn reflected on an increase on the number of people that go to nature to relax or practice any kind of sport. Some of these areas are legally protected due to their sensitive nature, so we anticipate an increase on the negative impacts felt on these areas, and consequently on the natural resources[1]. Problems such as loss of native vegetation, waste deposition, soil compaction, erosion, are some of the negative impacts that can arise from an intensive use of trails crossing natural areas[3]. Since the above-mentioned sports are mostly practiced along these trails, an increase in the intensity of use of the trails by this kind of events, will most probably lead to an increase on the impacts felt.

The present study aimed to analyze the variation in the practice of recreational activities linked to nature in the Azores, after the entry of Low-Cost airlines, based on Trail Running and Geocaching practiced on the island of São Miguel.

**Study Area**

The Azorean archipelago, an outmost region of Portugal, has 9 inhabited islands grouped into 3 groups: western, central and eastern. Our work was developed in São Miguel, the largest island of the archipelago located in the eastern group, at latitudes 37º42' and 37º54'N and longitudes 25º51' and 25º08'W (Fig. 1a), and with an area of 746 km$^{2}$[,4].

**Methodology**

We have adopted a mixed methodology based on: (1) collection of data on the number of passengers arriving in S. Miguel from national and international flights, along with the number of guests and overnight stays, for the period of 2010-2019; (2) elaboration of a survey aimed at athletes participating in the Epic Trail Run Azores, a race that took place from 5$^{th}$ to 8$^{th}$ December, 2019; (3) collection of volunteer geographic data from the 19 most sought-after geocaches in São Miguel (https://www.geocaching.com), within the same time frame (Fig. 1b).

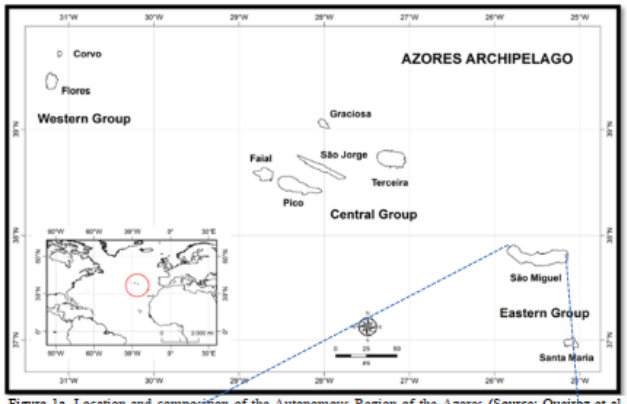


Figure 1a. Location and composition of the Autonomous Region of the Azores (Source: Queiroz et al, 2014).

Figure 1b. Map of São Miguel island with the location of the Geocaches used in the analysis, and the route of the EPIC110 race considered in this study. Representation of the various categories of protected areas present on the island (Source: prepared based on data taken from the sites: https://www.geocaching.com, http://www.epictrailrunazores.com/pt/provas/epic-110/, and annex II of DLR n. º 19/2008/A).

## Results

Since the entry of Low-Cost airlines in the Azorean air market, the number of passengers disembarked on the island of São Miguel, as well as the overnight stays, increased significantly. As an example, there was an increase of 38% in disembarked passengers in the first year of Low-Cost flights (2015), the majority of which came from national flights. This increase was also observed in the number of practitioners of the sports of nature analyzed, a result corroborated by the application of the survey to the Epic Trail Run Azores athletes, who said that the possibility of flying Low-Cost, had a great impact in their decision to participate in this event. Moreover, the majority of the athletes participated in the event for the first time and were escorted by family or friends.

The Geocaching results showed that the maximum number of registrations occurred in the year of the air space liberalization, however the number of logs has been decreasing over time, following a global trend around this activity. Through the analysis of both activities, we conclude that their practice has been combating the so-called seasonality that existed before the airspace liberalization, since what was previously more common in the months from July to September, now expands throughout the year. This applies to both Geocaching and Trail Running events such as Epic Trail Run Azores, which takes place every year in the month of December.

## Conclusion

Our data confirms a significant positive variation in the number of practitioners of these nature-based recreational activities in S. Miguel island, with a tendency to increase over time. In view of this growth, there is a need to take measures in order to fight the potential increase of negative impacts on nature, and to maintain the international certification of the Azores as a "sustainable destination". The creation of Nature Sport Cards to each protected area, can help to manage and monitor the several recreational activities that can take place in a certain area, in order to improve the quality of the nature-based sports while protecting the environment.

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# 153 Tourist carrying capacity. A turning point to a sustainable tourism model. The case of Alt Pirineu National Park – Spain.

**Víctor Dorado[1], Estela Inés Farías-Torbidoni[1], Ricardo Nogueira Mendes[1,2], Serni Morera[1], Marc Garriga[3], Moises Villanueva[3]**, [1]National Institute of Physical Education of Catalonia (INEFC). University of Lleida., Spain. [2]CICS.NOVA, NOVA FCSH, Lisboa, Portugal. [3]Parc Natural de l'Alt Pirineu (PNAP). Generalitat de Catalunya., Spain

## Introduction

In the last decades, the world population has increased its physical sports activities in the natural environment. According to the last Eurobarometer survey about outdoor sports, Spain figures in third place with 53% of the population claiming that have been involved in physical outdoor activities, after Finland (67%) and Austria (54%) (European Commission, 2018).

As a result, there has been an increase in overcrowding in Protected Areas, which has attracted the attention in the Spanish mass media revealing the consequences that have already demonstrated in various environmental (Cole, 2008; Newsome, 2014; Pickering, 2010; Salesa & Cerdà, 2020), social (Weiler et al., 2019) and security studies (Moscoso, 2004).

On that point, different public and private entities requested solutions to manage overcrowding in different natural parks through the determination of the Tourist Carrying Capacity (TCC), i.e. maximum number of people who can visit an area at the same time, without damaging the physical, economic or sociocultural environment, nor cause an unacceptable decrease in the quality of visitors satisfaction (OMT, s. f.).

This article aims to show the application of the Cifuentes' (1992) methodology about the TCC in 17 trails of Alt Pirineu Natural Park (PNAP), within Vall Ferrera to be included in the next trail guide of the park.

## Study area

The PNAP is the largest protected natural area in the Catalan territory, with a total area of 79,317.21 ha. It extends to the northwest of Catalonia (in the Pyrenees), between the Pallars Sobirà and l'Alt Urgell regions, specifically in the Valls d'Àneu, Vall de Cardós, Vall Ferrera, Vall de Santa Magdalena and Macizo de l'Orri. The Vall Ferrera is the most easterly valley, belonging to the municipality of Alins, which has an area of 17,456.45 ha, under the protection of the park. See figure 1.

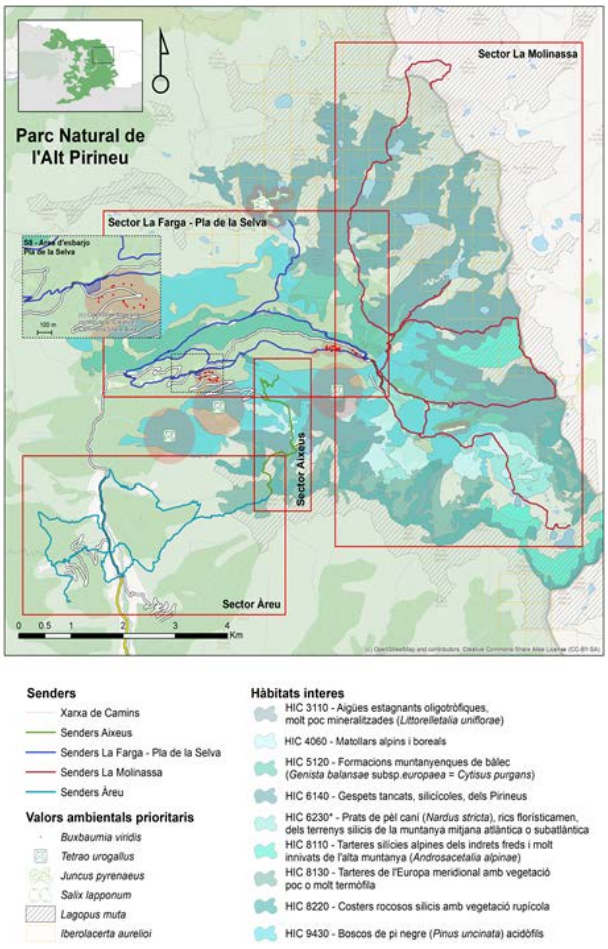



*Figure 1. Study area map. Vall Ferrera divided in management units. Own elaboration.*

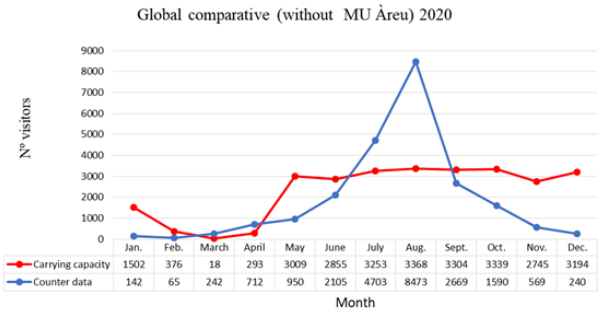
## Methodology

This study was carried out following Cifuentes' (1992) methodology. It is based on the review of three levels of analysis: Physical Carrying Capacity (PCC), Real Carrying Capacity (RCC) and Effective Carrying Capacity (ECC). The calculation parameters were adapted to the characteristics of the study area following a five-step approach to establish the tourist carrying capacity in la Capçalera of Vall Ferrera:

1. Sectorization of the Capçalera of Vall Ferrera regarding the main parking areas.
2. Selection of the main trail network based on the park guide map and the trails previously identified by Farías-Torbidoni (2011) and Farías-Torbidoni i Morera (2017) frequentation studies.
3. Initial proposal to establish a theoretical calculation of the TTC, with special reference to the identification of the reduction factors (climate, environmental, soil erosion, trail difficulty, social, trail use behavior and public infrastructures).
4. Calculation of the Tourist Carrying Capacity (TCC) and comparison against the influx (without MU Àreu, there's no counter data).
5. Draft of the first proposal for management measures.

**Results**

From a global perspective, the TCC in Vall Ferrera was determined to 71.125 visitors per year, which represents 5.927 and 195 visitors per month and day, respectively. The analysis of the TCC values per month compared to the influx of visitors (figure 2) showed that the carrying capacity was slightly exceeded during March, April, but largely surpassed in July and August, being these two months the most critical with 1.449 and 5.105 over visits respectively.




| | Jan. | Feb. | March | April | May | June | July | Aug. | Sept. | Oct. | Nov. | Dec. |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Carrying capacity | 1502 | 376 | 18 | 293 | 3009 | 2855 | 3253 | 3368 | 3304 | 3339 | 2745 | 3194 |
| Counter data | 142 | 65 | 242 | 712 | 950 | 2105 | 4703 | 8473 | 2669 | 1590 | 569 | 240 |

*Figure 2. Global comparative of the carrying capacity versus the influx of visitors data of 2020 of the management units with available influx data (without MU Àreu).*

**Conclusions**

This study has allowed to establish a turning point between the TCC and the influx of visitors, from which alternatives could be proposed to the management of the public use of the Vall Ferrera.
Finally, it should be kept in mind that this is an initial and limited study, who considers only theoretical aspects. As the last recommendation, it is proposed to ratify the unit management identification as a good option to manage the overcrowding of Vall Ferrera.

**Acknowledgements**

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## 172 Sewage management in remote protected areas: high mountain challenge

**Magdalena Sitarz**, **Paweł Kauzal**, **Marek Kot**, **Maria Król**, **Marcin Matysek**, **Jarosław Rabiasz**, **Antoni Zięba**, **Tomasz Zwijacz Kozica**, Tatra National Park, Poland

**Introduction**

Protected areas around the world have to deal with the problem of tourist pressure. Providing access to the most valuable natural areas has a great impact on the environment. This task is especially difficult in the core zones of the protected areas which are remote and far from the urbanized zones. One of the many identified threats associated with the intense tourist traffic is sewage pollution (Lebersorger et al. 2010, Weissenbacher 2008, Andreottola 2003). In the Tatra National Park the problem of sewage pollution becomes more and more crucial over the years. The reason of that is gradually rising number of tourists (almost 4 million of tourists in 2019 and 2020) who visit not only tourist trails and other specially dedicated areas but also trespassing the fragile natural habitats. In mountain shelters, located in the core zone and mostly in remote areas generally biological wastewater treatment plants are used, which very often hardly deal with the enormous amount of sewage. What is more faecal contamination occurs also nearby the tourist trails. As a result this situation is causing pressure on the nature, including the pollution of streams and ponds. Around the world there are many different solutions regarding the sewage management. The aim of this research is to gather and analyse these solutions in order to recommend the best options for the protected areas, especially remote.

**Methods**

In order to gather information about the sewage management in the protected areas a questionnaire was prepared and send to 143 national parks around the world. For the purpose of the investigation mostly national parks with alpine character and tourist infrastructure remote from urbanized areas and difficult to install a sewage system have been chosen. Filled questionnaires have been received from 27 national parks, located in 16 countries. The questionnaire consisted of 11 questions. First 8 questions were related directly to the sewage management. It was important to determine if sewage issue is occurring in the protected areas. Last 3 questions were focused on scientific research and field observations regarding the influence of sewage on nature as well as the planned investments related to the sewage management in the protected areas.

**Results**

Answers obtained from 27 national parks were divided into two main groups. In the first one, which consisted of 11 national parks sewage management was an issue. In most of them, toilets are located in the core zone in locations such as: mountains huts, accommodation or gastronomic facilities, centres of education, tourist trails or entrances to the national park. Sewage is managed there in different ways depending on the local conditions, which generally vary from dry toilets, biological or mechanical wastewater treatment plants with draining in the underground, to septic tanks and sealed bags. In national parks which used sealed bags to dispose sewage the most common kind of transportation is helicopter but horse, motor boat and of-road vehicle are also used. National parks which used dry wells collect sewage in reservoir without using any chemicals and then transport them to the valley. In 4 national parks sewage system is used and sewage is transported even up to 10 km from the area of the park and treated in collective wastewater treatment plants and biological or mechanical wastewater treatment plants. There are not many scientific researches regarding the influence of sewage on nature. But those which were conducted showed that sewage might cause a serious threat to high-mountains streams and lakes. Despite the lack of scientific research, in some national parks negative effects of sewage such as eutrophication of lakes, bad water quality, more faecal pollution near the trails and in streams were observed. In some national parks there are plans to modernize the sewage management by construction of treatment facilities, build or improve biological or mechanical wastewater treatment plants and connect huts to the sewage system.

In the second group, which consisted of 16 national parks sewage was not a problem. In 8 of them toilets are located in the core zone. Sewage are managed by composting toilets and bags, biological wastewater treatment plants, draining over the ground, infiltrating of water in the ground and biocompost containers, dry wells and disposed by a municipal company. In 8 national parks there are no toilets in the core zone and this is why it is convenient to use the sewage system. Only one park dispose sewage in sealed bags, which are transported using helicopter. Thanks to the proximity of the city, sewage is transported on short distances, up to 1 km. It is stored in biological wastewater treatment plants, discharge to the river, drain over the ground, infiltrate to the ground or septic tanks are used. One park is using dry wells, but no chemicals are added. Scientific researches regarding the influence of sewage on nature were not conducted. Only the biological water quality was monitored. In one case it was observed that the infiltration wells were not filtering properly because they were sealing. They were cleaned and chemicals used to restore sufficient filtering. Increasing eutrophication in the reservoir was also observed. The only planned investment regarding the sewage management is to use Biolan compost system.

**Conclusions**

Data collected from 27 national parks show that sewage is effectively managed through sewage systems. Other kind of sewage management are not efficient enough. The good practise is to build toilets and other facilities outside the protected areas. But this is an easy solution for parks with low number of visitors (like in Norway). Analysing the data from the received questionnaires, insufficient level of scientific research and observations of the impact of sewage on nature was noted.

Probably due to the SARS-CoV-2 we have received information from small number of national parks. Described problem is very complex and because of growing pressure of tourism on nature the research on this matter should be continued and extended to more national parks.

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## 111 Mountain huts as observatories of tourism transition

**Philippe Bourdeau[1]**, **Laine Chanteloup[2]**, **Christophe Clivaz[2]**, **Marc Langenbach[1]**, [1]University of Grenoble Alpes, France. [2]University of Lausanne, Switzerland

In the face of the cumulative effects of climate and societal changes, mountain touristic development is currently experiencing a strong adaptive injunction of mountain tourism destinations. Alpine tourism development model based on seasonal snow resources and winter sports resorts is subject to uncertainties and weaknesses that brought it to a tipping point (Bourdeau, 2007; Clivaz & al., 2015). These call into question existing economic balances, territorial dynamics and mountain policies. In this tipping phenomenon, climate change acts as an amplifier and accelerator of structural contradictions, especially as its multiple effects combine themselves with societal, socio-cultural and technological changes. In this context, tourism is faced with a major transitional challenge having both spatial and temporal characteristics. This structural redefinition of the foundations of mountain tourism suffers from a major lack of knowledge on the governance and visitor flows of "less-developed" mountain areas. What is at stake is a transition trajectory based on a territorial rebalancing between "less-developed mountain areas" and "developed mountain areas", which appears particularly strategic on the scale of the Swiss and French Alps.

In this presentation we will present a French-Swiss research project called "Mountain huts as observatories of the tourism transition. The repositioning of less-developed mountain areas and their related professions in the French-Swiss Alps" (HutObsTour). Started in April 2021, this 4-year project is funded by the French National Research Agency and the Swiss National Science Agency. Conducted jointly by the Lausanne University and the Grenoble Alpes University, it focused on the mountain huts and the related professions (hut keepers, mountain guides, mountain leaders) as privileged markers, both in terms of infrastructure (huts) and culture (professions) to tackle and observe the changes and adaptations of the mountain tourism transition in the Alps. At the interface between valley and high mountain, huts play a nodal role in the tourist flows of less-developed mountain areas, while the creative capacity of the professional activities of accommodation (hut keepers) and supervision (mountain leaders and guides) that they generate is stimulated by the effects of uncertainty and crisis.

The objectives of the project are based on research needs identified by two previous programs, whose major results will be briefly presented in order to understand how the refuge can be an observatory of tourism transition:

1. Refuges Sentinelles (Mountain huts as sentinel) program (France), co-led by the Labex ITEM and the Ecrins National Park since 2016, aims to develop an experimental system for observing changes in high mountain, based on mountain huts as places for measuring, observing, working and exchanging information between the natural and social sciences (**http://refuges-sentinelles.org/**).
2. The seed funding project "Les refuges comme observatoires de la transition récréative en haute montagne" (Mountain huts as observatories of the recreational transition in high mountain), funded by the Interdisciplinary Centre for Mountain Research in Switzerland in 2019. It helped us to build the ground for the HutObsTour project through a state of the art and an in-depth dialogue with the local stakeholders in Switzerland (Obin et al., 2020).

Based on the results of these two previous projects, the main objectives of the HutObsTour project are:

- The development of a better knowledge (characterisation, measurement, typologies, modelling) of tourist dispersion and polarisation – outside the perimeters of resorts – which are inherent to centrifugal practices of which huts are nodal points;
- The documentation of creative actions (Joas, 2008; Bourdeau, 2019), defined as the range of new initiatives and professional practices that contribute to innovation by transforming cultures and professional activities;

- The identification of socio-technical locks-in (Geels, 2002), which undermine the capacity for adaptation and transition of mountain tourism professions, sectors and territories, as well as the levers for "unlocking" them: inclusion of environmental and safety issues, adaptive behaviour of professional practitioners and operators at the tourist destination level, etc.;
- The study of the governance processes taking place in mountain tourism which affect the regulation and training of mountain professionals, the management of mountain huts, the access to less-developed mountain areas and the question of tourist flows, the interactions and impacts on biodiversity, the conflicts over land use and the various ways of dealing with the environment.

In order to reach these objectives, three work packages were defined and will be presented:

1. The implementation of an experimental observation system appropriate to the spatial and temporal dispersion of tourist flows in less-developed mountain areas: inventory of the methodologies, techniques available to observe and measure visitor flows in natural and recreational areas, and exploitation of user-generated content compiled on social networks and community platforms (GPS tracks, marked summits and routes, posted photographs) ;
2. The study of the transformation of the missions and cultures of mountain professions: examination of the processes by which mountain-related tourism professions (keepers, guides and leaders) are changing and reorganizing themselves in the light of changing climatic and societal conditions;
3. The analyze of the structuring role of mountain huts in the governance of less-developed mountain areas and in the diversification of tourism: how mountain huts are changing in order to welcome new clientele and to adapt to the evolving expectations of visitors, for example in terms of the place occupied by technology, of the relationship with comfort, and of community life, and how "off-resort" governance works – a blind spot in studies carried out on mountain tourism so far.

This presentation will also come back on the methodology used for the three work packages.

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# 133 What do website review activities imply about natural park users?

**Yoshiaki Shimazaki**[1], **Christian Crowley**[2], [1]Akita Prefectural University, Japan. [2]U.S. Department of the Interior, USA

**Introduction**

Information-provision is a low-cost way of potentially affecting levels of park use. Providing information about amenities at various parks, along with information on current conditions can affect users' choices of where to visit [Shimazaki and Crowley (2014)]. This is similar to how profit maximizing firms provide information (often as advertisements) to attract consumers. However, this tool may not always be used effectively by non-profit-maximizing park managers. Shimazaki et al. (2017) quantified the amount of information available on Japanese national park web sites created by the government managing authority, and investigated the relationship between information and the degree of national park use. They found that the amount of information posted on the authority's web site is not related to the park visitation.

Some internet services provide a platform to exchange information. Social network services allow users to transmit information not only among people with which the user has an established relationship, but also more widely, among people with no previous contact. Other internet services are specially designed to allow people to post public reviews of what they purchased or experienced.

Such information on the internet often reflects people's preferences, based on what they find worth mentioning, providing an indication of their underlying utility functions. For non-marketed goods like public goods and common resources, uncovering the factors affecting people's perceived quality of experience is crucial for the management of resources.

In this study, we investigate what information are park users are transmitting, focusing on subjective information such as user reviews from internet travel services. We also investigate the correlation between the number of review activities and the official visitor counts of parks to see if review activities can be used for estimating the number of park visits. The results of this study would help park management authorities seeking to optimize park user experiences, for example through information provision.

**Methodology and Data**

Japanese natural parks display great variation in the range of park information available. For example, visitors to Mt. Fuji will find a wide range of information readily available, while visitors to lesser known national parks may have a more difficult time locating information they need. As mentioned in Shimazaki et al. (2017), this variability suggests using Japanese parks as a test case to investigate information transmitted by park users.

We determine the factors important for national park users by analyzing reviews posted on an internet travel information service. The website 4travel.jp is a large Japanese website for posting travel reviews and comparing prices for travel-related services. The site holds over 1.6 million domestic travel reviews, including overall ratings of experiences from 1 (worst) to 5 (best). From the website, we collected all review data posted as of July 4, 2017, using the Python programming language's web crawling function.

To determine whether a given review is related to national park travel or not, we selected reviews with specific keywords related to national parks. The keywords are points of interest referred to in the website of 33 national parks operated by the Japanese Ministry of the Environment. We found a total of 32,236 such reviews. We assumed that these reviews are posted on the website by people who actually visited the places.

Our next step was to identify frequently appearing words using the text analytics application IBM SPSS Text Analytics for Surveys. The application also analyzes the sentiment of reviews; we focused on reviews with an overall positive sentiment. Table 2 shows a summary of the text analysis, excluding general words such as "do", "go," etc.

Words frequently appearing in reviews include "nature," "food," "hotel," "access," "hot spring," "shrine," "weather," and "applause for the

price." Moreover, about 93% of the reviews were determined to be positive sentiment ("positive"). We use the rating and the positive sentiment as dependent variables, and run separate regressions to determine the relationship of each variable with frequently appearing words.

**Results**

The web reviews we analyzed included ratings of the visitor's overall experience, from 1 (worst) to 5 (best). The regression results for the text analysis, using rating as the dependent variable, are shown in Table 1.

We found that "nature," "shrine," and "weather" are positively and significantly related to the ratings of travel experiences in national parks. Among these, "nature" is the word most related to higher ratings, followed by "shrine," and then "weather".

Table 1: Regression results for ratings

| variable | Coef. | Std. Err. | p-value | |
|---|---|---|---|---|
| nature | 0.167 | 0.008 | 0.000 | *** |
| food | 0.010 | 0.010 | 0.335 | |
| hotel | -0.014 | 0.011 | 0.196 | |
| access | 0.004 | 0.009 | 0.649 | |
| hot_spring | -0.004 | 0.012 | 0.760 | |
| shrine | 0.144 | 0.012 | 0.000 | *** |
| weather | 0.040 | 0.012 | 0.001 | *** |
| p_applause | 0.000 | 0.015 | 0.994 | |
| _cons | 3.939 | 0.007 | 0.000 | *** |
| n | 32,236 | | | |
| Adj R^2 | 0.018 | | | |

Next, we found that the number of review activities and the official visitor counts of parks are highly correlated with correlation coefficient 0.82.

**Concluding Remarks**

This study investigated the factors important for national park users by analyzing reviews posted on an internet travel information service. The results indicated that mentions of "nature," "shrine," and "weather" are positively and highly related with ratings of travel experiences (on a scale of 1 to 5). Moreover, we found that "food," "nature," "weather," "hotel," and "hot spring" are highly related to the reviews determined as having a positive sentiment. The results indicate that national park users tend to exchange information related to nature, weather, and (perhaps surprisingly) shrines. This may differ substantially from reviews for non-nature-based tourism.

We also found that the number of review activities and the official visitor counts of parks are highly correlated. It indicates that the number of review activities could be useful for estimating visitor counts for unmonitored natural parks.

Natural areas provide an attractive recreational resource and yet are subject to negative impacts from use (and overuse). This paper suggests that information-oriented management can improve user welfare by not only limiting or avoiding those impacts at popular sites, but also by introducing users to new areas.

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# 80 Volunteer activities for semi-natural grassland conservation in Japan and the impact of COVID-19 on these activities

**Reiko MACHIDA[1], Tetsuya Aikoh[2], Masanori Take[3], Hajime Matsushima[4], Shoji Yasushi[4], Naoyuki Mikami[4], Yozo Mitarai[1]**, [1]TOKYO UNIVERSITY OF AGRICULTURE, Japan. [2]Hokkaido University G. [3]University of Tsukuba, Japan. [4]Hokkaido University, Japan

**Introduction**

The changes in the landscape are caused by the economic and social forces of the early 19th century and particularly of the 20th century (Matej M., Frantisek P., 2013). The community of Nezasa (Pleioblastus yoshidake) and Susuki (Miscanthus sinensis) plants forming the typical semi-natural grasslands of Japan used to cover approximately 10% of the land of Japan until the 1930s. The semi-natural grasslands have been managed by local agricultural activities such as controlled burning, mowing and pasturage for over 1000 years, but recently, due to the decline in the livestock industry and the gradually aging population, the landscape management of semi-natural grasslands has become increasingly difficult. The loss of semi-natural grasslands, which have decreased to less than 3% of the national land has become a key issue. In the Second National Biodiversity Strategy of Japan, the Japanese government designated such landscape crisis as Crisis 2, which is “the degradation of Satochi-satoyama (rural landscapes formed by sustainable use of natural resources) due to insufficient level of management”.(Ministry of the Environment, 2012). But recently, due to the decline in the livestock industry and the gradually aging population, the landscape management of semi-natural grasslands has become increasingly difficult. The loss of semi-natural grasslands, which have decreased to less than 3% of the national land has become a key issue.

The Aso-Kuju National park in Kumamoto Prefecture has been managed by local agricultural activities such as controlled burning, mowing and pasturage for centuries. Aso is characterized by the world’s largest caldera and semi-natural grasslands landscapes. The region of Aso includes more than 50% of the grass plants Nezasa and Susuki in Japan, making it one of the most important biodiversity hotspots nationally. The decline of the livestock industry and the increasingly aging population, the landscape management of grasslands has become increasingly difficult. To address the shortage of manpower, the volunteer activity in Aso attracted a lot of motivated people outside of Aso since 1990’s. A volunteer group was founded to support the controlled burning work under the name Aso Green Stock in 1995.Also, approximately 960 volunteers carry out maintenance tasks such as the controlled burning together with the local inhabitants presently. Therefore, the conservation activities in Aso’s grasslands came to attract nationwide attention as pioneer examples of tackling such landscape crises.

However, the impact of COVID-19 on protected areas has affected biodiversity, economy, tourism, communities (John Waithaka, at all.2021) Volunteer activities have made it difficult for traditional face-to-face volunteers. Also, the grassland conservation activities have become difficult to perform due to the COVID-19 pandemic. It is necessary the guidelines on managing semi-natural grasslands during a pandemic.

**Method**

This study was conducted a questionnaire survey with 486 grassland conservation volunteers in Aso in September 2020. The questions were related to the COVID-19 safety measures and the volunteers’

intentions to continue the grassland conservation activities. The question topics were as follows: Intention to participate in grassland conservation activities after COVID-19, Safety of outdoor grassland conservation activities, and Intention of grassland conservation activities involving movement.

**Results**

According to the survey results, 81% of the volunteers wanted to continue the grassland conservation activities in line with infection control measures. In addition, 73% of volunteers answered that they felt the risk of contracting the infection is low, since the grassland conservation activities are performed outdoors. On the other hand, elderly volunteers and volunteers living in metropolitan areas such as Tokyo, tended to shy away from volunteer activities. According to the survey results, there was no tendency to refrain from moving across the prefectural borders of the Kyushu area, where the Aso-Kuju National Park is located, or across nearby cities, towns and villages. Volunteers had a strong motivation to participate.

Concerning future measures against the COVID-19 pandemic, the following points should be considered. It is important for participants to take appropriate measures according to their living area and age, to follow safety measures for working in groups, and to properly disseminate information related to volunteer activities.

**Acknoledgement**

This work was supported by JSPS KAKENHI Grant Number 19H02981

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# 181 Estimating visit volume at the county level: An application of a variant form of the Lincoln Index method

**Jinyang Deng**, West Virginia University, USA

It is important to have an accurate estimate of visit volume to a destination. While this may be easily done for a place with controlled gates and/or with ticket sales, it is a major challenge for a destination (e.g., a county) without gate counts. This study uses a variant form of the Lincoln Index method to estimate visit volume for Garrett County, Maryland based on data collected from two survey periods: 2008-2009 and 2019-2020.

## Methods

### Data collection

A questionnaire was developed by drawing on findings from the literature with inputs from the Garrett County Chamber of Commerce. The questionnaire was administered to visitors that were randomly approached at 21 locations/events (Figure 1) during 2008-2009. A replica survey was conducted using the same version of the questionnaire during 2019-2020 at 20 locations, most of which are the same as the survey period 2008-2009.

### Estimation of visit volume

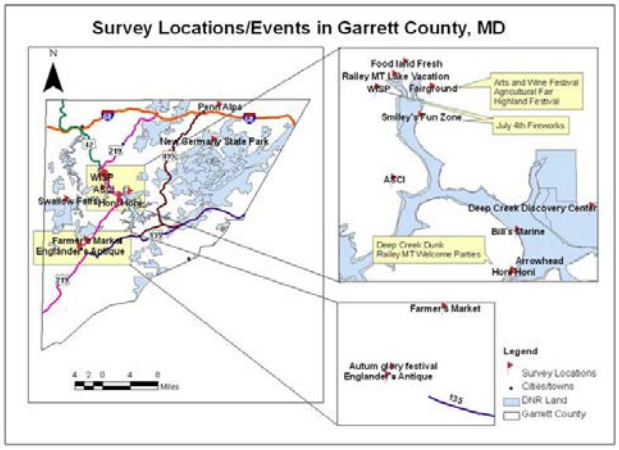
The Lincoln Index is a method that is originally developed to estimate the size of closed population of an animal species. The method was later applied to estimate attendance of open access events (Brothers & Brantley, 1993). Basically, the Lincoln Index method has its root in the simple random sampling method with an assumption that the proportion of marked animals in the sample is equal to the proportion of the marked animals in the whole population. Applying this method to the context of tourism, it is assumed that for a given visitor type, the proportion of a visitor type in the surveyed sample is the same as the proportion of the same visitor type in the population (Deng et al., 2017):

$$\frac{S_i}{S_t} = \frac{P_i}{P_t} \quad (1)$$

$$P_t = \frac{S_t * P_i}{S_i} \quad (2)$$

Where Si: number of visitors surveyed for visitor type i; St: total number of visitors surveyed; *Pi*: total number of visitors documented for visitor type i during the survey period; Pt: total visitor number during the survey period. Since *Si* and *St* can be obtained through survey, the total visitation can then be estimated if the actual visitation for visitor type *Pi* is documented.

Visitor types were identified by accommodation. During the survey, respondents were asked to report the lodging they stayed or will stay during their visits to the county. Respondents were also asked to report their frequency of visits to the county in the previous 12 months.




## Results

The total number of nonlocal visitors approached during 2008-2009 was 4,931 (vs. 4,378 for the period 2019-2020). Of this number, 2,692 (vs. 2,693 for the period 2019-2020) were willing to fill out the questionnaire, resulting in a response rate of 54.6% (vs. 61.4% for the period 2019-2020).

The average frequency of visits in the previous 12 months was 6.8 for the period 2008-2009 vs. 6.0 for the period 2019-2020. Garrett County has documented the total number of overnight visitors who have stayed in cabins during the survey period. This number was 19,009 person-trips for the period 2008-2009 and 29,503 for the period 2019-2020, respectively. Based on the surveys, cabin guests visited

the county 2.53 times on average in the previous year for the first survey period and 2.09 times for second survey period, resulting in the number of cabin guests being 7,514 (that is, 19,009/2.53) for the period 2008-2009 and 14,117 (that is, 29503/2.09) for the period 2019-2020, respectively.

Both surveys asked visitors to report their frequency of visits in the previous year and use it as a proxy for the frequency of visits for the current period. This is not without problem as visitation is largely subject to many unexpected external factors (i.e., disease, weather, price, etc.) which would result in visitation volume being different from year to year. To correct this, as with the survey during the period 2008-2009, only frequency of visits reported in the recent season was used for the estimation because it reflects the frequency of visits for the survey period more realistically than other seasons during which reported frequency of visits goes beyond the survey year. The frequency of visits of most recent season was 4.85% for 2008-2009 and 7.17% for 2019-2020, respectively. Based the above formulas, the total number of visitors was estimated at 154,928 persons (i.e., 7,514/0.0485) for the first survey and 196,880 persons (i.e., 14,117/0.0717) for the second survey, which can then be used to estimate the number of visitors of other visitor types by multiplying the number of 154,928 or 196,880 by the percent of a visitor type. Finally, person-trips for a given visitor type can be derived by multiplying the number of visitors of the visitor type by the frequency of visits of that visitor type. The total person trips by this approach was 1,117,744 for the period 2008-2009 and 1,398,150 for the second period (Table 1).

Table 1. Estimation of person-trips

| Visitor type | Percent (% of persons surveyed) | Persons | Frequency of visits | Person-trips | Percent (% of person-trips) |
|---|---|---|---|---|---|
| Day trippers | 24.56 | 37969 | 10.91 | 414245 | 37.06 |
| | **22.09** | **43491** | **10.58** | **460133** | **32.9** |
| Hotel/motel | 12.85 | 19866 | 1.94 | 38540 | 3.45 |
| | **11.46** | **22562** | **2.84** | **64077** | **4.6** |
| Bed & Breakfast | 2.52 | 3896 | 0.71 | 2766 | 0.25 |
| | **1.65** | **3249** | **1.86** | **6042** | **0.4** |
| Stay with friends/family | 13.16 | 20345 | 4.31 | 87687 | 7.84 |
| | **12.88** | **25358** | **3.36** | **85203** | **6.1** |
| Short-term RV/Campground | 3.29 | 5086 | 2.67 | 13580 | 1.21 |
| | **2.91** | **5729** | **5.0** | **28646** | **2.0** |
| Cabins | 4.86 | 7513 | 2.53 | 19009 | 1.70 |
| | **7.17** | **14116** | **2.09** | **29503** | **2.1** |
| Vacation rental home | 19.47 | 30100 | 1.59 | 47859 | 4.28 |
| | **25.35** | **49909** | **3.63** | **181170** | **13.0** |
| Second home owner | 18.32 | 28322 | 16.81 | 476099 | 42.59 |
| | **14.76** | **29,059** | **18.36** | **533,532** | **38.2** |
| Others | 0.96 | 1484 | 12.1 | 17958 | 1.61 |
| | **1.73** | **3406** | **2.89** | **9843** | **0.7** |
| Total | 100.00 | 154,583 | 100.00 | 1,117,744 | 100.00 |
| | **100.00** | **196,800** | **100.00** | **1,398,150** | **100.00** |

Note, values in bold refer to the survey period 2019-2020.

**Conclusion**

Interestingly, the total person-trips of 1,398,150 estimated for the year 2019 are quite comparable with the total number of 1,427,887 documented by Maryland Department of Natural Resources (DNR) for the state park visitation in the same year. Although a direct comparison does not make too much sense as the DNR visitation reflects multiple counts of the same person at different locations, and thus it overcounted the actual person-trips. However, it does not count people who visited other parts of the county, although some people who visit one or several units of the park system may also visit other sites of the county for shopping, eating during or other purposes during the same trip. Nonetheless, the DNR data can provide a reference point by which the current estimation can be judged/gauged. It should be noted that the estimation of 1,117,744 for the survey period 2008-2009 is also quite comparable with the DNR documentation of 1,200,522 for the year 2007. In addition, if the frequency of visits for the whole year was applied, the total estimated person-trips would be 1,192,619 for the year 2018, which is also quite comparable with the total visitation of 1,178,009 documented by DNR. Thus, the method used in this project is reliable and valid (as DNR data are valid).

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# 169 Krka National Park's biodiversity as basis for wildlife tourism development

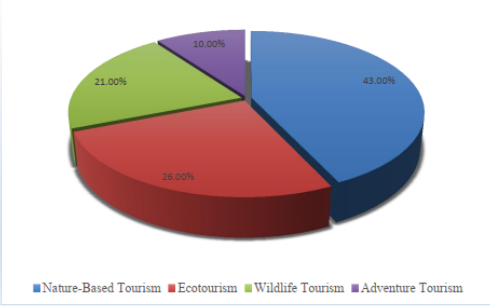
**Anđelko Vrsaljko**, University of zadar, Croatia

Krka National Park, a karst hydrological pearl of the Croatian coast with its distinctive geological, geomorphological, hydrological and biological richness, was declared a National Park in 1985. The geomorphological playfulness of the river Krka with the karst canyon along with 7 magnificent waterfalls with numerous lakes, rapids and cascades create an unreal and unique landscape pearl which generates a rich biological diversity. However, the tourist offer of the park does not differentiate or implement specific forms of tourism such as wildlife tourism, which is why the paper investigates the perception of visitors about the valorization of the park's biodiversity as a paradigm for the development of wildlife tourism; especially since the park is filled with a number of valuable, rare and endemic species. The research maps out the species' habitats and proposes a unique programme for the visitors which prefer the wildlife tourism.

**Krka National Park's Biodiversity as Basis for Wildlife Tourism Development**

*Anđelko Vrsaljko, Department of Teacher and Prezchool Teacher Education Studiez, University of Zadar, Franje Tudmana 24i, 23000 Zadar, Republic of Croatia., avrzalj@unizd.hr*

Figure 1. Which form of tourism would you be interested in the Krka National Park




**The aim of the research and the methodology**

The questionnaire was used as the primary measuring instrument of this empirical research. The survey incorporated a semi-structured questionnaire that was conducted on a sample of 303 respondents (N = 303). It was conducted directly with visitors of the park in person. The primary research included 12 questions about socio-demographic characteristics, 10 questions about staying in the park and experiences of the Park and 20 statements reagrding visitors' attitudes about biodiversity as a paradigm of wildlife tourism development (Likert scale 1-7). A 7-item scale was used to obtain a greater response differentiation. Variational analysis was used to process the results .

**Biodiversity as a particularity of the Park**

The research of the flora of NP Krka recorded 1.186 different plant species, among which the most numerous are Mediterranean and southern European plants with several endemic species (41 endemic taxa in the Croatian flora). According to the results of the research, about 1000 species of invertebrates live within the National Park, 9 amphibian species, 19 species of reptiles, 229 bird species, more than 200 species of butterflies and 46 mammal species (16 of which are endangered bat species).. The freshwater part of Krka is inhabited by 20 different fish species, of which 11 are endemic. The research of speleological objects revealed 129 species, many of which are rare, and among them were several endemics.

**Survey on the biodiversity of the Park**

Different socio-psychological profiles of the respondents (59% foreign visitors) demonstrated sensitivity towards certain natural values in the park. Moreover, one third of the respondents were be open to undergo an educational program on the park's flora and fauna. A particular interest towards the wildlife tourism was shown by 21% of respondents (Figure 1), which is an objective ecological niche for this form of tourism.

When it comes to the biological heritage as a prerequisite for the development of wildlife tourism,

the visitors generally agree (scores ranging from 5 to 7) in most of the 20 claims. This is clearly illustrated by the following statements: Considering the size of it, there is an exceptional biodiversity in the park (70%); Wildlife Tourism has a long-term perspective in park's tourism (78%); Ichthyofauna/fish are extremely interesting to observe (70%); Endemic species are an invaluable treasure of the park (85%); Conditions are suited for the development of bird watching tourism (72%).

To conclude, the exceptional biodiversity in and around the park can and must be valorized via wildlife tourism whilst taking into account the health of the park's ecosystem in its entirety. The obtained results present a foundation for the practical designing of the permanently sustainable wildlife tourism, i.e., although special attention is given to the protection and preservation of the species and habitats, the biological richness of the park still becomes accessible to the interested parties. Finally, this wouldn't interfere with the economic or marketing benefits of the park as a tourist destination.

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## 156 Publicly reported trail experiences: A mixed-methods dive into the internet corpus

**Dani T. Dagan**[1], **Jessica P. Fefer**[2], **Christopher Zajchowski**[3], **Matthew T.J. Brownlee**[1], [1]Clemson University, USA. [2]Kansas State University, USA. [3]Old Dominion University, USA

While many visitor monitoring efforts measure discrete and quantifiable attributes, such as spatial distribution of visitors or economic values, many aim to capture more subjective qualities. Monitoring visitor experience is one such undertaking. Visitor experience extends beyond objective qualities about the recreation environment, and studying it requires understanding nuances about visitors' perspectives that can be difficult to generalize. These perspectives can be studied qualitatively to capture in-depth and nuanced data, or quantitatively in order to generate ore comparable or generalizable results. Both of these approaches are strong and useful, and in this study we aimed to capture the strengths of both these approaches in a novel mixed-methods methodology using publicly available web data. Using trip report data from a popular trail website, we were able to describe visitor experiences in a way that is both large in scale and reflective of subjective experiences.

Our approach begins with an exploratory machine learning model followed by an explanatory qualitative coding phase, and results are presented descriptively as a topic model map with accompanying narrative visitor experience vignettes. To pilot this approach, we investigated the visitor experience along the Potomac Heritage National Scenic Trail Network (POHE) in the United States, with the goal of evaluating both the big-picture visitor experience across the entire trail network and the spatial variability. The POHE trail network is several hundred miles long and offers a variety of experiences spanning three states and the District of Columbia. On the website alltrails.com, visitors have left short reviews of over 100 small lengths of the trail network that together comprise POHE. Additionally, managers of POHE have identified several trail segments that they manage as distinct units. We scraped the review text from alltrails.com and used a machine learning text analysis process called Latent Dirichlet Analysis to identify common topics across the entire trail, as well as differences between topics that occur in each trail segment. We then selected random occurrences of each topic and qualitatively evaluated their context and term usage to further clarify how the topics relate to visitor experience. This also allows us to produce an overall description of visitor experience along the entire POHE network. Finally, we evaluated each trail segment based on its unique combination of topics and the contexts of those topics to produce visitor experience vignettes.

# Covid-19: Impacts on nature-based recreation and tourism

| SESSION | PART | DATE | TIME | CHAIRS |
|---|---|---|---|---|
| 1A | I | Tuesday 17th August | 14.00 – 15.20 CET | Peter Fredman |
| 2A | II | Tuesday 17th August | 15.40 – 17.00 CET | Don English |
| 4A | III | Wednedsay 18th August | 14.00 – 15.20 CET | Teresa Magro-Lindenkamp |
| 5A | IV | Wednedsay 18th August | 15.40 – 17.00 CET | Peter Fredman |
| 6A | V | Wednedsay 18th August | 20.00 – 22.00 CET | Marjo Neuvonen |

| | Programme |
|---|---|
| *1A* | **30** Managing "over-tourism" of natural and sensitive areas using visitor data |
| | **42** Using Google's Mobility Data to understand park visitation during the COVID-19 pandemic: A note of caution |
| | **107** Using Mobile Big Data to assess visits to national parks before and during COVID-19 |
| | **73** Visitor monitoring during the COVID-19 Pandemic |
| *2A* | **94** Impact of COVID-19 on forest visits in the early 2020 COVID-19 pandemic: Evidence from Switzerland |
| | **102** Impact from Covid-19 on outdoor recreation in Sweden |
| | **124** The impact of Covid 19 on outdoor recreation in the UK: benefits and challenges |
| | **12** Outdoor recreation during the corona pandemic – experiences and trends from western Sweden |
| *4A* | **132** Role of urban nature in Copenhagen during global pandemic – taking urban cemeteries as an example |
| | **81** The importance of nature during the COVID-19 pandemic - experiences of national outdoor recreation demand inventory in Finland |
| | **15** Covid-19 as an opportunity to newly discover Switzerland's nature-based cultural landscapes. Qualitative study among German-speaking Swiss holiday guests in Switzerland. |
| | **106** The effect of COVID-19 on visitation to US forest service wilderness |
| *5A* | **174** The role of outdoor recreation during the COVID-19 pandemic and its impacts on recreational behavior and attitudes towards nature in Finland |
| | **11** Outdoor recreation and nature's contribution to well-being in a pandemic situation - case Turku, Finland |
| | **43** Changes in children's lifestyle and outdoor activities due to COVID-19 in Japan |
| *6A* | **41** Changes of tourism under impact of COVID-19 pandemic in Stołowe Mountains and Karkonosze Mountains National Parks, south-western Poland |
| | **127** Changing visitor influx during the covid-19 pandemic. The case of Serra de Collserola Natural Park, Barcelona. |
| | **131** Impacts of lockdown on the management of Brazilian National Parks |
| | **59** Small nature-based tourism firms and their ability to cope with major external changes exemplified through Covid-19 |

## 30 Managing “over-tourism” of natural and sensitive areas using visitor data

**Laurent Guennoc**, Eco-Counter, France

For several years now, visitor management in nature parks has been an ongoing discussion. The fragile balance between welcoming the public and preserving natural areas has always been at the heart of decisions, sometimes difficult to make, by natural area managers.

The current health context reinforces these tensions, with the increased importance of natural spaces, between periods of lockdown and the human need for outdoor spaces for exercise and leisure.

In sensitive natural areas, and particularly in areas with high tourist pressure, the management of overcrowding has become a major topic, in the light of the COVID-19 crisis.

Two specific topics have come to the fore: on one hand, health constraints may now require a specific threshold not to be exceeded, and on the other hand, the overall visitor experience and the preservation of sites, which requires measuring the number of visitors to avoid trampling and natural site degradation, whether they are natural parks, beaches but even periurban spaces.

Recently, the Calanques Park in Marseille announced the launch of a "demarketing" campaign to reduce tourism pressure on the site and preserve the site, its fauna and flora. This campaign was done by exposing the reality of the site and counter the "Instagram" effect which tends to over-publicize natural sites by minimizing difficulty of access, overcrowding in summer, etc.

Eco-Counter has been working for 20 years with natural areas managers on these issues. Through the example of Miribel Jonage natural park, this presentation will show how visitor data can guide choices.

Spreading the number of visitors over the whole year through the development of educational activities in Miribel Jonage natural park (Lyon)

This presentation will highlight the topic of “over-tourism” and natural site attendance management with the example of the Miribel Jonage park in Lyon. The Grand Parc Miribel Jonage is a 2,200-hectare park located in the Lyon metropolitan area, which is both a leisure and recreation area, as well as a drinking water reserve for 95% of the Lyon region, and a site with an exceptional natural heritage: it is classified as a Natura 2000 site, a Natural and Sensitive Area, and a Natural Area of Ecological, Fauna and Flora Interest (ZNIEFF).

The management and the animation of the site in all its diversity of objectives includes 4 main missions:

1. protection of the Lyon urban area against floods,
2. protection of the drinking water resource,
3. protection of the natural heritage,
4. reception of the public, through a lake, a leisure centre (“L'atôl'”) and an environmental & educational center (“L'îloz'”

Set up to the east of the park in 2015, the Ilôz' educational center for environment and the park's peninsula are equipped with permanent counters to monitor visitor trends at these two emblematic sites for nature-related educational activities.

The peninsula is physically distant from the parking lot by about 500 to 800m and is also separated from the recreation areas, which means that it attracts a specific public. Thanks to data collection over several years, the site managers were able to conclude that these places attract a specific public, with high attendance in mid-season (September/October), periods of the year presenting ecological interests, but rather average in summer period (ratio between the period from May to October and the period from November to April is only 1,41, meaning the average monthly attendance is 10,000 people for colder months, 15,000 for hotter months). On the other hand, the same ratio for the leisure center is 2,68, with average monthly attendance for colder months reaching 10,500 and attendance for hotter months 28,233.

With the goal to spread out the use of the park throughout the year, data collected validates the relevance of developing ecological activities (observation of migratory birds, beavers, etc.), which attract a different public, and help reduce the summer peak in use and the associated human pressure.

Identify parking saturation on the site

Data on car traffic was also collected and made it possible to determine the number of cars physically present on site, through different thresholds of site saturation: regular parking, unauthorized parking and site saturation. Park managers calculated using IN and OUT flows the level of site occupancy, and identified different thresholds when parking is made either:

- legally on dedicated areas (which corresponds to an estimated cumulated occupancy of 1,500 cars),
- illegally, but does not prevent site access (up to 2,900 cars)
- illegally, preventing site access (more than 2,900 cars)

This saturation is problematic, especially since it has an impact on bus traffic, which can no longer access the park. And in a logic of reducing pressure on the site, it is essential to favor access via public transport to individual cars. The data collected justify actions and policies to be implemented to prevent this phenomenon.

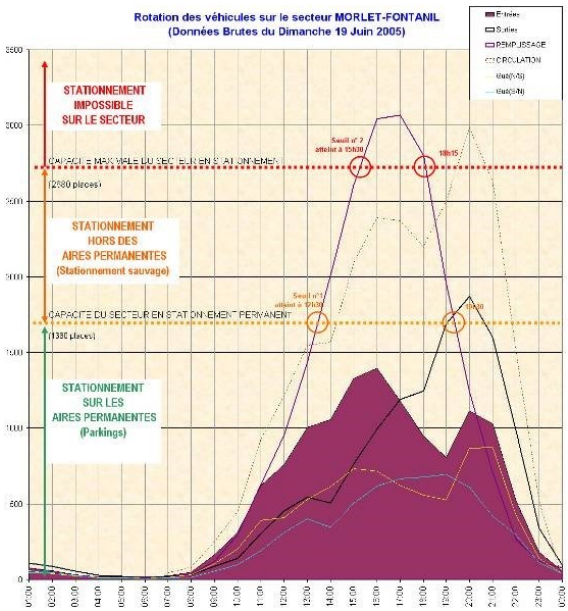


*Figure 1. Hourly traffic profile and site saturation thresholds, (credit Christophe Jarraud, Segapal)*

**Conclusion**

Beyond quantifying different usages of natural and sensitive areas, attendance data also allows the construction of occupancy indicators, to help managers make decisions and inform the public. With permanent counters installed outside and inside buildings if necessary, site managers can communicate if necessary in real time to adapt the opening hours or to intervene on site.

# 42 Using Google's Mobility Data to understand park visitation during the COVID-19 pandemic: A note of caution

**William Rice[1]**, **Bing Pan[2]**, [1]University of Montana, USA. [2]Pennsylvania State University, USA

The COVID-19 pandemic has dramatically impacted park visitation around the globe. In an effort to understand the factors influencing these changes, numerous attempts have been made to use big data to monitor changes in park use (e.g., Venter et al., 2020). Google's Community Mobility Reports represent a dataset with significant potential in this regard. Released in April 2020, these reports were generated on the hypothesis that "aggregated, anonymized data could be helpful [to] make critical decisions to combat COVID-19" (Fitzpatrick & DeSalvo, 2020, para. 1). The heading on the reports' website asks browsers to "see how your community is moving around differently due to COVID-19" (Google 2020b). The data released through the reports are generated from "aggregated, anonymized sets of data from [Google] users who have turned on the Location History setting, which is off by default" (Google 2020b).

**Methods**

To understand drivers of changes in park visitation during the first wave of the COVID-19 pandemic in the western United States, we gathered data from Google's COVID-19 Community Mobility Reports (Google, 2020c). This data contains daily mobility trends—calculated as difference from the "baseline" period of January 3rd to February 6th, 2020—for areas such as national parks, public beaches, marinas, dog parks, plazas, and public gardens" (Google, 2020a, p. 1). We generated a coefficient for 97 U.S. counties representing the average daily change in park mobility from April through June 2020. These 97 counties were selected based on data availability, representing a continuous swath of counties having park mobility data available for at least half of the days of the study period.

Using a spatial lag model, we assessed a number of independent variables with relation to their influence on changes in park visitation (see Table 1). Each of these variables were selected either because of previous demonstration of their influence on park visitation or their use by policymakers in controlling and adapting to the COVID-19 pandemic.

**Results**

The results of the spatial lag model are listed in Table 1. On average, among 97 counties examined in this study, there was a 20.2% increase in park visitation compared to the baseline period. Concerning the spatial lag model, according to the $R^2$, the independent variables' variance account for 62% of the variance within the dependent variable. Just two variables were found to be statistically significantly predictive of change in park visitation: elevation and latitude. Duration of safer-at-home orders and median age showed borderline significance (below 95%) in their prediction of change in park visitation at a 92.5% confidence interval.

**Discussion and Conclusion**

All else being equal, the overall increase in park visitation from the baseline period indicates that individuals living in the study area were able to visit parks despite the limitations of the pandemic. However, our results indicate that the use of January and February 2020 park visitation levels as a baseline for calculating changes in park visitation is troublesome. This contention is based on the finding that only elevation and latitude—not any of the variables directly related to the pandemic—were predictive of changes in park visitation during the first wave of the COVID-19 pandemic in the western United States. This suggests that much of the change in park visitation depicted in Google's Community Mobility Reports is the function of seasonality rather than the pandemic. Climate, influenced by elevation and latitude, is a noted driver of seasonal changes in park visitation (Smith, 1993). We therefore posit that Google's park mobility data are misleading, biased by geography. Researchers must be very careful when using big data to assess visitor use trends in parks, as the curation of the data may be less-than-transparent.

*Table 1: Model Summary*

| | Definition | Source | Min. | Max. | Mean | Coefficient | Std. Error | p-value |
|---|---|---|---|---|---|---|---|---|
| ***Dependent Variable*** | | | | | | | | |
| **Park Visitation** | Average percent change in daily park use among county residents during the study period (April 1st – June 30th, 2020) from the baseline period. Baseline use is calculated are the median values, for the corresponding day of the week, during the 5-week period January 3rd to February 6th, 2020. | Google (2020b) | -59.0 | 101.8 | 20.2 | | | |
| ***Independent Variables*** | | | | | | | | |
| **Population density** | Population per square mile based on 2018 census data | United States Census Bureau (2018) | 1.8 | 18384.2 | 514.5 | -0.0004 | 0.0013 | 0.7450 |
| **Median age** | Median age of county residents based on 2018 census data | United States Census Bureau (2018) | 29.6 | 53.9 | 39.1 | -0.7954⁺ | 0.4123 | 0.0537 |
| **Duration of Safer-at-home order** | Number of days throughout the study area where county-level safer-at-home order was in place | Killeen et al. (2020) | 38 | 72 | 46.7 | -0.4693⁺ | 0.2613 | 0.0726 |
| **Confirmed COVID-19 Cases within county** | Total confirmed cases within county as of June 30th, 2020 | Centers for Disease Control and Prevention (2020) | 5 | 103,529 | 3,737.2 | -0.0002 | 0.0002 | 0.2645 |
| **Latitude** | Centroid latitude of county | ESRI (2020) | 37.0 | 62.5 | 49.3 | 3.33057*** | 0.5757 | < 0.0001 |
| **Elevation** | Average elevation (meters) of county | ESRI (2020) | 1 | 2,118 | 356.1 | 0.0135** | 0.0049 | 0.0063 |
| **Population within ½ mile of park** | Portion of population within a buffer of ½ mile radius of a park | Centers for Disease Control (2019) | 0.12 | 0.99 | 0.59 | -4.5577 | 14.4969 | 0.7532 |
| ***Model Specs*** | | | | | | | | |
| **Spatial lag effect** | | | | | | 0.2090⁺ | 0.1140 | 0.0667 |
| **Constant** | | | | | | -96.0302*** | 27.4610 | 0.0005 |

**⁺p < .075, *p < .05, **p < .01, ***p < .001** Breusch-Pagan test: 13.26, p = 0.066 $R^2$ = 0.623
**Multicollinearity condition number = 27.12** Likelihood Ratio Test: 2.92, p = 0.088 AIC = 895.699; BIC = 918.871

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# 107 Using Mobile Big Data to assess visits to national parks before and during COVID-19

**Tuuli Toivonen**[1], **Vuokko Heikinheimo**[1,2], [1]Digital Geography Lab, University of Helsinki, Finland. [2]Finnish Environment Institute, SYKE, Finland

The mobility restrictions related to COVID-19 pandemic have resulted in the biggest disruption to individual mobilities in modern times. The crisis is clearly spatial in nature, and examining the geographical aspect is important in understanding the broad implications of the pandemic (Oliver et al. 2020). Visitations to national parks or other natural areas have experienced a tremendous change during the pandemic. In some areas, like in Finland, visitors seeking for experiences or less crowded places have crowded national parks. This has caused a need for national park managers to add services to the parks. In other places attracting high numbers of international tourists, like Madagascar, the visitor numbers have dropped drastically leading to problems of local livelihoods and even pressure to use land for alternative purposes like food production (Eklund et al. 2020).

To understand these changes and their impact, there is a need to monitor how and where people use natural areas. Mobile big data (data collected by mobile phone operators or various apps) has been considered valuable for conservation already for some time (Di Minin et al. 2015; Tenkanen et al. 2017; Toivonen et al. 2019). The pandemic has highlighted the high potential of mobile big data even further (Poom et al. 2020). Mobile Big Data makes it possible to study the spatial effects of the crisis with spatiotemporal detail at the national and global scales. The data is being collected continuously, allowing monitoring change over time. The importance has not been left unnoticed: Some companies, like Google and Apple, have shared previously inaccessible information about people's mobility patterns openly online, allowing, for a limited time period, new analyses also about visits to nature.

In this presentation, we discuss the usability of Mobile Big Data in the context of monitoring the use of green areas during the pandemic. We base our presentation on two analyses that examines the disruptions caused by the pandemic at the global and at more local scale.

In the global scale analysis our main objective is to understand the impact of the covid-19 pandemic on visits to national parks across global regions demonstrating the differences between the Global South and North. We use social media posts made on Flickr platform as our source. Despite many gaps, limitations, and regional biases, Flickr is one of the few available data sources that allows global analysis of visits to protected areas (Tenkanen et al. 2017; Toivonen et al. 2019). We examine the changes in visitor numbers overall and compare how visitation of international and domestic visitors have changed in the Global South and North.

Our second example employs mobile phone data from a Finnish mobile phone operator. The data has previously been used for analyzing the use of urban parks (Heikinheimo et al. 2020). With the detailed mobile data, we are able to show the changes in park visitation, the demographies of visitors as well as the origins of the visitors compared to pre-covid times. We compare the results to surveys made by the national park authority Metsähallitus.

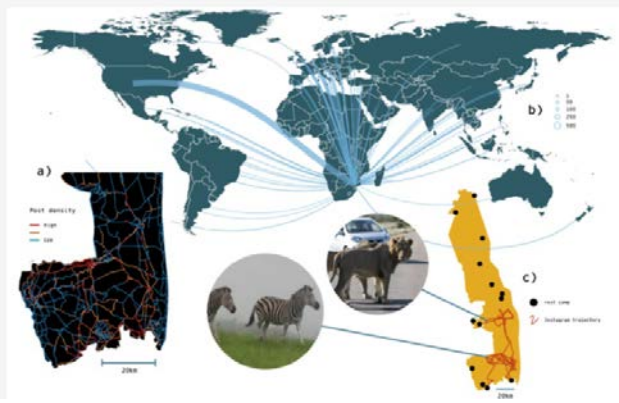


*Figure 1. Mobile big data allows analyses of national park use from global to local scales (figure adopted from Toivonen et al. 2019. In this presentation, we provide examples at the global scale (using Flickr*

*data) and at the local scale using mobile phone data provided by a mobile operator.*

Based on the example studies and our previous works, we broaden the discussion to the added value and challenges of Mobile Big Data in covid analytics. In addition to the promise that these data sets hold, they also come with many challenges. Many of the challenges have to do with the ownership of the data. The data sets are collected and managed by private companies unlike many data sets traditionally used in environmental sciences. If released for research use, they are often produced without detail on how they have been collected or aggregated, causing a lack of transparency in details that may fundamentally impact the interpretations (see an example in Willberg et al. 2020). Furthermore, for those data sets that have been made accessible, it is unclear how long these data products will be available for research use.

The analyses with mobile big data during the pandemic have made us call for change in mobile big data management and access. In this presentation (see also Poom et al. 2020), we therefore call for:

- harmonized and representative data about human mobility for better crisis preparedness and social good in general
- methodological transparency about mobile Big Data products are vital for open societies and capacity building;
- access to mobile Big Data to develop feasible methodologies and baseline knowledge for public decision-making is needed before the next crisis occurs;
- recognizing the fundamental spatiality of the current COVID-19 crisis and crises more generally is the most relevant of all.

**Acknowledgements**

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## 73 Visitor monitoring during the COVID-19 Pandemic

**Michelle Rose**, **Parks Victoria**, Australia

Parks Victoria's Charter is to manage National, State and Metropolitan parks and waterways, recreational boating facilities, jetties and piers and other recreation, and tourist assets. This makes up approximately 18 percent of all land in Victoria, Australia, with more than 100 million visits to parks, bays and piers every year.

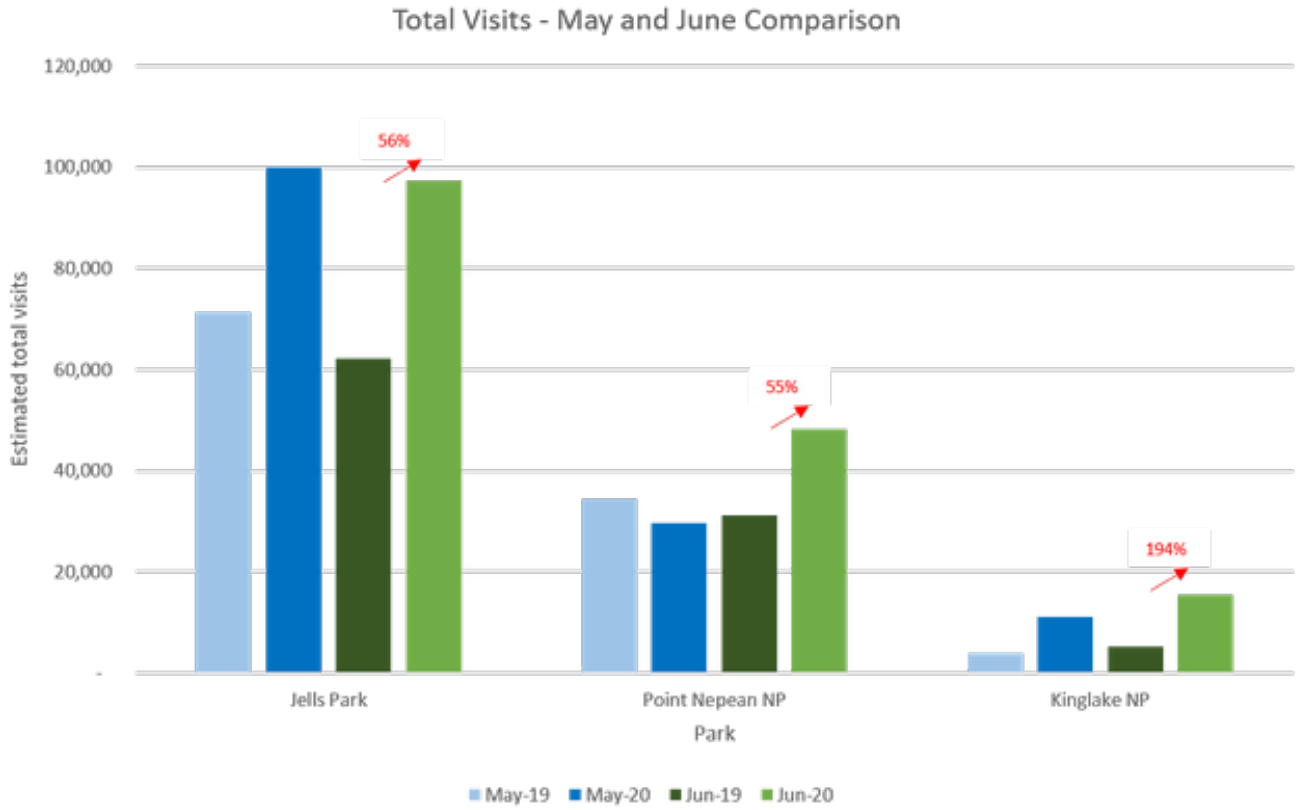
In 2020, due to the COVID-19 global pandemic, visitor monitoring became increasingly important in park management and decision making to ensure health and safety protocols were enacted in park to prevent further community outbreaks. During the COVID-19 restriction periods, staff and visitor monitoring documented changes in visitor use and numbers in the park system. Understanding the wellbeing benefits of being in nature as has been documented in past research, Parks Victoria wanted to examine the physical, emotional and social wellbeing benefits of being in nature and how this had changed due to the COVID-19 pandemic.

This presentation displays two key research areas to understand the changes to visitation and ways in which Victorians used parks and protected areas during the COVID-19 Pandemic:

1. Park based visitor monitoring
2. Impact of COVID-19 on park usage applied research project

**Park based visitor monitoring**

Parks Victoria determines accurate visitation statistics for individual parks using vehicle and pedestrian counters. For parks with visitor nodes accessed primarily by road, permanent or temporary remote download vehicle counters provide accurate visitation estimates. The majority of parks saw decreases in annual visitation for the 2019/20 financial year due to impacts of bushfires and COVID-19. The Black Summer bushfires over January and February 2020 had an impact on visits to regional parks, with sites such as Buchan Caves closed during the peak




*Graph 1: May and June 19/20 monthly comparison*

summer season. While there were decreases in annual visits at the majority of monitored parks due to the COVID-19 pandemic and lockdown restrictions triggering park closures, several parks saw significant increases in visits during the months of May and June 2020. Point Nepean National Park, Kinglake National Park and Jells Park all saw large increases in visits in the immediate period after restrictions were lifted, end of May and June 2020. Jells Park, Dandenong Ranges Botanic Garden, Point Nepean National Park, Tower Hill Wildlife Reserve, Macedon Regional Park, Wilsons Promontory National Park and Kinglake National Park all saw increases in visits in June, the initial post lockdown restrictions period, suggesting the importance of parks during this time.

**Impact of COVID-19 on park usage applied research project**

The ongoing COVID-19 pandemic has made significant changes to the way Victorians use public parks and protected areas. Parks Victoria in partnership with Colmar Brunton, investigated changes in park usage and the impact this had on wellbeing. The study also quantified concerns and expectations Victorians had about using parks and protected areas for future planning.

Finding displayed that most Victorians avoided parks and protected areas during periods of lockdown (73%). Of those that did go to visit sites during lockdown, visitors typically spent less time than usual and came for short walks rather than longer stays for activities such as sightseeing. There were several concerns about visiting parks and protected areas identified by participants. Top concerns of visiting parks and protected areas during lockdown included; contributing to another outbreak (39%) and being unable to maintain social distancing in busy areas (38%). Positively, three in five who visited parks and protected areas during lockdown felt it had a positive impact to their mental and physical health (62% and 61% respectively) and two in five felt it was positive for their social health (41%). Victorians aged over 55 were significantly more likely to state that both their physical and mental health were positively impacted by being able to visit parks and protected areas during lockdown (83% and 81% respectively). Considering those who did not visit parks during lockdown, one in four felt that non-visitation had a negative impact to both physical and mental health (24% and 27% respectively). Visitation was expected to increase to levels seen prior to lockdown once restrictions lifted. In order to assure Victorians that parks are safe, one in three said they would like to see social distancing enforced at parks (37%) and slightly fewer would also like to see staff monitoring the number of visitors in parks (28%).

Over two in five Victorians believed Parks Victoria performed well during the pandemic (46%) and less than one in twenty considered the response to have been poor (4%). Further, three in five Victorians agree that closing public spaces was the right response (63%) fewer than one in ten perceive that this was the wrong decision (8%). Most Victorians also agreed that parks and protected areas should continue to receive investment even during times of economic recession (58%) fewer than one in twenty disagree with this sentiment (4%).

*Management implications*

Parks Victoria employed visitor number data in active planning with the pandemic response strategic intelligence unit to preserve public health. Due to high visitor use recorded, poor compliance and inability to socially distance, the decision was made to close certain parks for varying periods throughout the pandemic response. Predictive analytics were also conducted to assist in park management and planning for reopening parks. This included determining peak times of day when certain sites would be at capacity for the ability to socially distance, ensuring traffic management and compliance controls would be in place during these periods. The impact of COVID-19 research displayed the importance and wellbeing benefits of parks to the community and informed areas Parks Victoria could focus on to encourage Victorians to connect with nature. The data also suggested park visitation would be likely to increase in the post lockdown period, a trend that was captured with vehicle monitoring when this occurred.

# 94 Impact of COVID-19 on forest visits in the early 2020 COVID-19 pandemic: Evidence from Switzerland

**Anne C. Wunderlich**, **Boris Salak**, **Marcel Hunziker**, **Tessa Hegetschweiler**, **Nicole Bauer**,
Swiss Federal Research Institute WSL, Switzerland

On March 11 2020, the World Health Organization (WHO) declared COVID-19 as a pandemic and stated that "If countries detect, test, treat, isolate, trace, and mobilize their people in the response, those with a handful of cases can prevent those cases becoming clusters, and those clusters becoming community transmission." (World Health Organization (WHO), 2020). Thereupon many countries issued restrictions on public life to reduce the transmission of COVID-19. Most countries closed shops, restaurants, bars and leisure facilities. Social gatherings were forbidden, the number of people allowed to attend private events was limited. To reduce contact, many employees were sent to the home office. On March 14, Spain and Italy imposed strictest restrictions and even prohibited going outside for leisure activities so no one could visit urban green spaces (Ugolini et al. (2020)). In other countries social distancing and restrictions on public life lead to a visitor boom of green spaces and forests: Geng et al. (2021) analyze the impact of COVID-19 on urban park visitation with help of data from Google's Community Mobility Reports and Oxford Coronavirus Government Response Tracker to track government policies and restrictions at different stages. They use data from 16th of February to 26th of May for 48 regions in Italy, Spain, South Korea, United Kingdom, Denmark, Canada and Japan and conclude that social gathering restrictions as well as public information campaigns have had a significant positive influence on park visits and increased in each country of their sample park visits with one exception: Italy. Although later in May park visits increased in Italy as well. Ugoloini et al. (2020) conclude in their study with respondents from Croatia, Israel, Italy, Lithuania, Slovenia and Spain that motivation to visit urban green spaces changed during the lockdown period. Reductions in visitation were a consequence of less social gatherings in nature. Physical exercise on the opposite was one of the main reasons for respondents to visit a green space.

Many surveys were conducted in the beginning of the lockdown to analyze changed behavior of respondents. So far, no study was able to analyze the behavior of the same cohort of respondents before the lockdown and during the lockdown. We profit from a unique data set: In March - right before the COVID-19 induced lockdown - a Swiss wide online survey on forest visits and attitudes towards forests was conducted (n = 8064 respondents). This survey ended on March 9th 2020. On the 17th of March, the Swiss government implemented the lockdown due to increasing COVID-19 cases. To study the impacts of the lockdown, a second wave of the survey with 1085 respondents was held from March 2nd 2020 to April 9th 2020. Therefore, we are able to study the impacts of the policy induced lockdown and its implication on the working environment (such as home office and short-time work) and rising COVID-19 incidences on forest visits within the same cohort.

The 1085 respondents in the second wave of the survey were randomly chosen from a bigger sample of 8065 respondents who were surveyed in the first wave. Already the sample of the 8065 respondents was not a representative sample. LINK (a market research institute in Switzerland) administrators computed the survey weights based on the base weights accounting for probabilities of selecting into the sample and by post-stratification weights which were in line with benchmark distributions from Switzerland Census Population Surveys from 2019.

We estimate the effects of the rising COVID-19 cases and the associated changes in the professional environment – namely home office and short-time work or job loss - in Switzerland on the frequency of a forest visit in the time before and during the policy induced lockdown (number of forest visits per week) as well as the duration of forest visits pre- and during lockdown. We control for a series of socio-demographic factors and predictor variables that are likely to influence the frequency of forest visits (e.g. Hunziker et al., 2012), e.g. activities during the forest visits, motives of the forest visits, travel time,

extent of feeling disturbed during the visits. To measure the impacts, the following specification is used:

$$\Delta Y_{ist} = \beta_0 + \beta_1 \Delta W_{it} + \beta_2 \Delta C_{st} + \beta_3 X_i + \mu_{is}$$

where i is the individual in wave t. ΛW is the change in the individual working situation and ΛC are changes in COVID-19 cantonal incidence proportions. Furthermore, we use a model with first differences as a robustness check.

Respondents resided across all 26 of Switzerland's cantons and a higher share of the sample is located in highly populated cantons in Switzerland, like Zurich. Furthermore, the sample consists of 47% of males (53% of females respectively) and had an average age of 55 years. 21% of the respondents live in an urban area whilst 79% of respondents in an urbanized area or city.

In our sample, 628 of the respondents visit the forest on a regular base in the period from spring to autumn before the lockdown as well as during the lockdown. The mean visitation rate per week in this group increased in the phase of the lockdown from 1.9 days per week to 2.4 days per week. The 95% confidence interval for the mean changes of those variables does not include 0, and the estimated mean change is negative. This suggests that on average, regular forest visitors experienced a significant incline in mean days of visits per week. On the opposite mean duration of visits during the lockdown significantly declines from 76 minutes at the beginning of March to 64 minutes during the lockdown.

Results of our estimation specification show that the frequency of visitation during the lockdown is significantly driven by the individual working situation: Respondents working from home visit forests significantly more often during the lockdown period. Changes in cantonal COVID-19 incidence proportions do not directly influence visitation rates. Similarly, the change in the situation at the workplace (being in home office) has a significant and negative influence on the length of the stay in the forest.

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# 102 Impact from Covid-19 on outdoor recreation in Sweden

**Peter Fredman**, **Daniel Wolf-Watz**, Mid-Sweden University, Sweden

## Introduction

The Covid-19 outbreak has brought about radical changes for societies, individuals as well as the environment. Concerns about the infection and strategies to deal with it, including restrictions on travel and social interaction, have dramatically altered many peoples' lives. This includes also recreation in the outdoors as well as environmental impacts, following from crowding, pollution and greenhouse gas emissions. Considering the unique situation following the Covid-19 outbreak, it is of interest to study how outdoor recreation has changed and reflect upon possible environmental effects these changes may bring. We do this by asking the following questions;

1. Has participation in outdoor sports changed during the pandemic and why?
2. How has participation changed with respect to; transport and mobility, use of land and water, use of material and equipment, involvement in events, social values, motivation and meaning?
3. What are the potential environmental consequences, and opportunities, following the pandemic?

The study focuses on outdoor recreation participation in Sweden during the first months of the pandemic.

## Data collection

Collection of data followed a two-step procedure: An online survey and follow-up semi-structured interviews with a sample of survey respondents. The survey had eight questions focusing on participation in outdoor activities before and during the pandemic. Data collection used a snowball approach, where links to the questionnaire were distributed through websites, social media and a network of outdoor recreations administrators working at Swedish counties. The target group was people of the age of 15 years and above. Of the 530 valid answers, 86 respondents left their e-mail addresses and declared themselves willing to take part in a subsequent interview.

Semi-structured interviews were conducted from August to October 2020 with the primary aim to identify changes how people engage in outdoor recreation during the Covid-19 pandemic. The 22 interviews were conducted by telephone and each interview was recorded, transcribed and analysed with a thematic approach. Subsequent validity checks show that the survey data has an over-representation of female respondents compared with the national distribution. We also observe that a higher proportion of the respondents report they are member of an outdoor organization compared with the equivalent figures from previous national surveys. The age distribution, however, reflect the Swedish national distribution quite well.

## Results

Our results clearly indicate that recreation in the outdoors did increase during the covid-19 pandemic. Interestingly, we observe that people who reported they recreate in nature "seldom" before the pandemic were those who increased participation the most (Table 1). This applies particularly to weekdays, but also weekends and periods of vacation.

*Table 1. How recreation in the outdoors has changed due to the Covid-19 pandemic among people that report different recreation frequencies before Covid-19*

| | Decreased (%) | Unchanged (%) | Increased (%) | Sig. |
|---|---|---|---|---|
| **WEEKDAYS** | | | | |
| Never | 0.0 | 33.3 | 66.7 | $\chi2$=50.6; p=0.000 |
| Seldom | 0.0 | 23.3 | 76.7 | |
| Rather often | 4.1 | 46.9 | 49.0 | |
| Very often | 4.5 | 71.6 | 23.9 | |
| **WEEKENDS, HOLIDAYS** | | | | |
| Never | 0.0 | 50.0 | 50.0 | $\chi2$=41.9; p=0.000 |
| Seldom | 7.4 | 11.1 | 81.5 | |
| Rather often | 2.7 | 37.4 | 59.9 | |
| Very often | 3.0 | 64.2 | 32.7 | |

## Transport and travel

Several of the interviewees indicated a large reduction in long-haul international travel during the pandemic. Instead, visits to nature areas in the proximity of the residence increased, making recreation in the outdoors a "local affair". This also implies an increased use of cars and bikes as the mean of transport to get to nature areas, rather than public transport – especially in larger cities. Different forms

of co-transport outside the close family also decreased. People belonging to certain risk-groups, as well as those without access to a private car, felt more isolated than other groups.

**Use of land and water**

Many of the study participants report they tried out new activities during the pandemic. This also implies visiting and experiencing new places. We do get indications that popular areas, with facilities and easy access, has become more crowded. Less experienced people gather in popular areas, while people with more experience from being in the outdoors displace to more remote areas. The consequence is an increased impact on land and water, both in proximate and remote areas. Some respondents also report that areas previously popular among international tourists become more empty following the pandemic.

**Consumption of equipment and organized recreation**

Several of the informants have observed crowded stores and outfitters, while their own consumption of equipment has not changed very much following the pandemic. However, this may reflect that more experienced persons participating in the survey already have the equipment needed, and consumption takes place among the beginners. Participation in organized activities has decreased of obvious reasons since many organizations reduced their programs due to national or local restrictions.

**Social values**

Yet an interesting observation is the social role that activities in the outdoors has taken during the Covid-19. Restrictions against social gatherings in many parts of society, as well as spending more work hours at home, has made the outdoors as a place to socialize. People visit the outdoors in small groups, or may go there alone to see others. One informant expressed a strong feeling of cohesion by simply being in the outdoors observing other people.

Concluding remarks

Looking at the changes caused by the Covid-19 pandemic from an environmental perspective, we notice both pros and cons. Fewer long-haul trips produce less carbon-dioxide, while increased use of cars do the opposite. Increased use of recreational areas imply more impact on land and water. Digital alternatives to physical meetings certainly reduces travel, while other forms of environmental impact may follow. More important, however, is the evidence of change in society at large observed during the Covid-19, which opens up for new ways forward regarding environmental friendly outdoor recreation in the future.

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# 124 The impact of Covid 19 on outdoor recreation in the UK: benefits and challenges

**Sue Williams**, Natural Resources Wales, United Kingdom

## Introduction

Covid 19 has had a significant impact in the UK and has resulted in substantial changes to participation in outdoor recreation. A sequence of lockdowns where people were limited to 'stay at home' regulations within their local area, followed by the re-opening of travel and activities in the late summer of 2020, have affected the places that people visit and the activities that they can do. In terms of outdoor recreation, Covid 19 restrictions have ranged from being limited to one short walk per day directly from home for the express purpose of exercise, to tourism visits to anywhere in the UK to undertake the full range of possible outdoor activities within larger groups. In between these two opposites has been a variable number of greater or lesser restrictions on outdoor recreation and travel.

In order to understand the effect of Covid 19 on participation in outdoor recreation and associated land management issues, a number of robust social surveys and case studies have been undertaken by government agencies and academics across the UK. Many of these have been collecting evidence on a regular basis since the start of the pandemic and they provide a valuable resource to understand the impact of this societal wide change.

## Methodology

This research has analysed the range of surveys and associated evidence on the impact of Covid 19 on outdoor recreation in the UK from 2020 and the first half of 2021 in order to understand the effect that the pandemic has had on:

1. the places people visit, reviewing the fluctuations between local greenspace and tourist destinations as a result of changing lockdown regulations
2. the activities people undertake, including identifying any increases or decreases in specific activities such as walking and cycling
3. subjective health benefits, in particular relating to mental health and well-being, as well as physical activity levels
4. perceptions of crowding, social distancing, and personal risk from others in terms of exposure to Covid 19
5. any changes to motivations and barriers to participation in outdoor recreation as a result of the pandemic
6. quantitative data on proportional changes to visit numbers between lockdown and re-opening periods during 2020 and the first half of 2021
7. case study reports of land management issues, such as impacts of wildlife, parking issues, and environmental damage
8. perceptions of local communities on the impact of increased visitor numbers during the 'open' periods of the pandemic

## Results and Discussion

Covid 19 is an on-going pandemic, and the effect on outdoor recreation will continue to evolve. This research includes the analysis of the latest available evidence from 2020 and the first half of 2021, and will share the most current data from on-going surveys in 2021. Comparative analysis of multiple surveys will triangulate the results in order to identify commonalities from across different sources of evidence. In particular, it will map the changes in participation in outdoor recreation over the period of the pandemic, and link these to legislative restrictions within the UK. This will provide a unique insight into the effect of government policies and legal requirements during a fast-moving and ever-changing national situation.

The evidence from collated case studies indicates that there have been significant issues for land managers, both of local urban greenspace and more remote protected areas. The selected case studies used in this research provide examples from 2020 and the first half of 2021 of 'no intervention' compared with management actions including limiting visitor numbers and educational site-based signage. The analysis also includes a case study of a national nature reserve in Wales which is also a popular site for outdoor recreation which has used specialist

expertise in behavioural insights to inform the development of interventions to manage the impacts and maximise the benefits of visits.

Of particular interest will be the discussion around both perceptions of crowding and risk of transmission, in contrast to an increased sense of the outdoors being a 'safe' place from Covid 19. This discussion will be situated within wider theoretical research on perceived crowding that has been predominantly led by recreation researchers in the US. It will consider whether perceptions of an appropriate level of site users has been affected by Covid 19, along with the identification of any differences between rural and urban residents.

Conclusions will also be drawn in relation to the importance of outdoor recreation for subjective well-being and mental health. The restorative effects of nature have a substantial evidence base, for example the research relating to Attention Restoration Theory, and this research will review the evidence to understand if these psychological aspects have been perceived as having greater importance as a result of the Covid 19 pandemic.

Finally, the research will review future trends, based on the analysis of the changes in participation over the last 18 months using the latest data from 2020 and 2021. It will posit some indications as to the likely behavioural changes relating to outdoor recreation that might continue in the future, and the potential benefits and challenges that will arise for both land managers, recreation participants and local communities.

# 12 Outdoor recreation during the corona pandemic – experiences and trends from western Sweden

**Andreas Skriver Hansen**[1], **Javier Falla Arce**[2], **Ida Lindbergh**[2], [1]University of Gothenburg, Sweden. [2]Gothenburg Region, Sweden

The presentation reports on a study and published paper from western Sweden with a focus on the development of outdoor recreation in the region during the Covid-19 pandemic.

When the pandemic swept across Sweden and Europe in March 2020, it resulted in major changes in and consequences for outdoor recreation activities across the country. Quite abruptly, conditions for a normal life in Sweden changed in order to reduce the spread of the virus. People were recommended to not travel outside their own region or municipality, and public transportation became problematic to use. Citizens were advised to work from home and not socialize with others beyond their own social circle. In other words, the whole foundation of an active outdoor lifestyle changed. This had consequences for all citizens and, not least, outdoor organizations, many of which had to postpone or completely cancel activities. As a result, the basic conditions for outdoor recreation changed fundamentally.

But something else happened as well. Shortly after the pandemic took off, reports on increasing public interest in nature and outdoor recreation surfaced. Examples and discussions came from all corners of the country and were echoed globally. Preliminary observations, especially among local area managers, saw a sharp increase in visitor numbers. In some areas, so many arrived that it was difficult to receive all guests and at the same time show consideration for everyone and all activities. Life in the city also changed. The use of the city's green areas increased, becoming 'green oases' for people in search for a pandemic detox. Both local and national media began to write about the importance of exercise and moving around in nature. This likely helped to push many both newcomers and more routined outdoor enthusiasts into the outdoors. The reports and observations pointed in the same direction: outdoor recreation was undergoing new and rapid changes.

Against this background, researchers at the University of Gothenburg and Gothenburg Region, a co-operative organization for thirteen municipalities, decided to collaborate on a study with the purpose of documenting recreational changes caused by the pandemic in western Sweden. The study was part of a national research program, Mistra Sport & Outdoors (2020-2028), which aims to generate knowledge and solutions for increased sustainability in sport and outdoor recreation in Sweden. The study was to be a contribution to the increasing knowledge base on outdoor creation during the pandemic in Sweden and internationally. The study was also to lead to increased knowledge about the regional development and thus create a base for current outdoor recreation planning and management strategies in the region.

The study was done as a so-called Public Participation GIS (PPGIS) study (Brown & Kytta 2014). PPGIS is a method specializing in acquiring spatial data in a survey-like style, but based on an interactive mapping exercise, where participants plot activities on a map. The activity is usually followed by questions about the mapped activities and a more general survey. As is in the name, PPGIS studies uses a citizen science approach by inviting members of the public to participate and contribute with mapped data. A benefit of this approach is the opportunity to acquire large and often detailed data sets over short time, while it (usually) also is an interactive and interesting activity for participants. The study used a combined convenience and snowball strategy to reach citizens above 16 years of age in the region. The survey ran July to October 2020, four months in total. During that time, 4832 unique people visited the website, of which 1506 provided answers (approximately 32%).

Put together, the maps and survey results point to several new outdoor recreation trends during the pandemic. Main results include:

- Nature close to home has become important during the pandemic.
- There is a sharp increase and a high concentration of visitors in popular nature areas, such as national parks and nature reserves, but also in traditionally less popular nature areas, such as smaller green corridors and spaces in urban areas.
- Many respond that their outdoor habits have changed due to the pandemic and several point out that they will continue the habits even after the pandemic.
- People seek the outdoors in order to recover and energize, to be free from worries and to socialize. Indeed, nature has become a social space, a 'sanctuary', during the pandemic.
- Outdoor life in combination with exercise has become popular and can be linked to physical health. Walking, hiking, running and cycling are particular popular activities.
- The new recreational trends has become a lifestyle for many, especially those who did not use the outdoors much before the pandemic.
- Observed conflicts linked to the trends include increased crowding on paths, tracks and trails as well as cabins and parking lots, lack of consideration, visitors vs. landowners and littering.

From a management perspective, the reported trends have large and long reaching consequences. On the positive side, the development has led to increased interest in the outdoors and nature, which has been an outspoken political goal, both regionally and nationally. On the negative side, the current development and trends have also led to challenges for management, both those of a social nature, such as the abovementioned conflicts, and those of an ecological nature, such as increased pressure on the physical environment due to increased visitor volumes and a larger visitor spread.

The reported study has only scratched the surface when it comes to knowledge about the outdoor recreation trends that currently can be observed in the region. Furthermore, as there is no certainty about what will happen and be seen a year down the road, let alone a couple of months, it creates a precarious situation to be in from a research point of view. But all the more reason there is to closely pay attention to the trends observed now, as the world will not be back to normal after the pandemic. A new normal for the world, including outdoor recreation, is more likely.

*The opportunity to present the research was made possible by the Wenner-Gren Foundations, Sweden.*

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# 132 Role of urban nature in Copenhagen during the global pandemic – taking urban cemeteries as an example

**Yu Liu**, **Søren Præstholm**, **Anton Stahl Olafsson**, **Sandra Gentin**, **Maja Steen Møller**, **Berit C. Kaae**, University of Copenhagen, Denmark

## Introduction

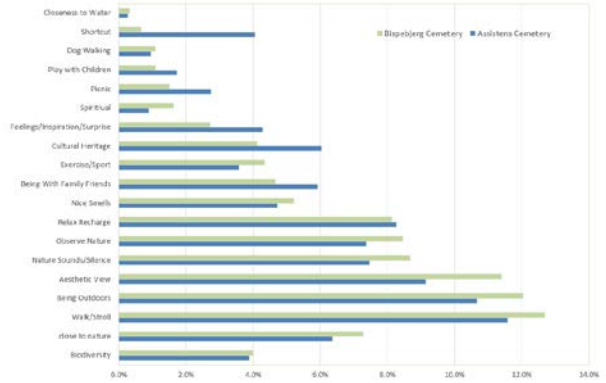
From March 11 and during the spring of 2020, the whole Denmark received a number of restrictions and recommendations modified outdoor behaviors because of the Covid-19 pandemic, which have had a great influence on the everyday life of Danes. A large number of the employees were asked to work from home while students were sent home to have home schooling. It was recommended to "keep distance" and avoid unnecessary "social contact" in the whole country, including outdoor areas. Common leisure institutes such as sports clubs and gyms were closed, and cultural activities such as concerts and cinema became inaccessible. Urban nature areas were open and accessible, and quickly became important places for citizens to get fresh air, hence take on a new meaning for everyday life, e.g. as alternative meeting places with good opportunities to keep distance or as a ground for exercise activities.

In general, the Covid-19 pandemic highlights the importance of urban nature as outdoor recreational spaces. Urban nature includes different types of green spaces, such as lawns, community gardens, parks, urban forests and urban cemeteries. The role of urban cemeteries as outdoor places is in focus in this study. Cemeteries act as active burial grounds in the city, but also as highly vegetated urban nature that potentially provides a diversity of outdoor experiences (Nordh et al., 2017). Previous research shows cemeteries hold the potential to provide recreational opportunities, and thus invite frequent use in the dense urban context (Quinton and Duinker, 2019; Swensen et al., 2016). Researching on urban cemeteries not only shed light on knowledge formation in terms of provision of ecosystem services, specifically recreation and mental restoration (Quinton and Duinker, 2019), but also help understand the role of this special type of green spaces in the urban fabric. Hence, this study aims to understand (1) who are using cemeteries and what experiential value(s) are highly valued during the pandemic (2) how important are urban cemeteries to local people and (3) what are the challenges for sustainable management of urban cemeteries as multifunctional green spaces.

## Material and methods

### PPGIS survey

PPGIS survey was conducted in the platform of Maptionnaire. The PPGIS survey provided questions about gender, year of birth, the number of people in household, the number of children, the level of education and working status. Participants were asked to map their home and places they spent time outdoors including side questions about experiences, social interaction and recreational activities. Respondents could choose among 19 options, which were Biodiversity, Close to nature, Walk, Being Outdoors, Aesthetic View, Nature Sounds/Silence, Observe Nature, Relax Recharge, Nice Smells, Being With Family/Friends, Exercise/Sport, Cultural Heritage, Feelings/Inspiration/Surprise, Spiritual values, Picnic, Play with Children, Dog Walking, Shortcut and Closeness to Water. Further, the survey provided the opportunities for people to give improvement suggestions. In this study, all the mapped visited places were distinguished within three categories: only visit during covid-19 times, visit usually in my everyday life, and both.




### Study area and data collection

The case study area is Copenhagen municipality. The PPGIS survey was handed out to citizen panels of five

out of ten local districts in Copenhagen from spring 2020, during the lock-down. The local panels consisted of volunteered recruited adults, operated by the local districts. Combined, almost 20,000 citizens were part of the five panels. We received replies from almost 5,000, which corresponds to almost 2% of the total population in the five districts. We obtained the whole dataset with 4947 home addresses, 8819 visited places as well as 39235 mapped experiential values. There are five urban cemeteries operated by Copenhagen municipality.

**Results**

1125 visited places and 7101 experiential values are within these five urban cemeteries. In this study, Assistens cemetery and Bispebjerg cemetery are the top two most visited cemeteries, which is located in Nørrebro and Bispebjerg district in Copenhagen. The most highlighted experiential values in these two cemeteries are aesthetic views, being outdoors and taking a walk – each accounts for about 10% among all the experiential values (fig 1). Cemeteries also provide the opportunities for other outdoor activities, such as exercise and sports. Due to the fact that cemeteries are highly vegetated, other experiential values such as nature sounds, nice smells are also appreciated by people. Most importantly, people also mapped the mental restoration values in urban cemeteries as a place for deep feelings, inspiration and surprise.

We found, urban cemeteries were highly used by locals, especially people living in the same district.

People traveled a shorter distance to the cemetery in the local district compared to people from other districts visiting the same cemetery. In terms of Covid-19 behaviors, visited places in cemeteries were marked by new users during the pandemic, however, more participants expressed that they only used the cemeteries before Covid-19, due to crowding concerns. For the vast majority, the cemeteries were used both before and during the pandemic.

The urban cemeteries face sustainable management challenges, as people highlighted the importance of infrastructures and expressed concerns about user conflicts and crowding during their visit during lockdown. In general, the magnitude and diversity of experiential values, social interaction and recreational activities expressed by visitors in cemeteries highlighted the importance of cemeteries as recreational green spaces of city context. This requires management attention, since cemeteries should not only be managed with a sole focus on traditional burial grounds with spiritual and tranquility experiences, but a diversity of experiential values, satisfaction of different user groups and physical quality.

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## 81 The importance of nature during the COVID-19 pandemic - experiences of national outdoor recreation demand inventory in Finland

**Marjo Neuvonen**, **Liisa Tyrväinen**, **Tuija Lankia**, **Anne-Mari Sepponen**, Natural Resources Institute Finland (Luke), Finland

Access to natural environments has been linked to have positive effect on physical and mental health (WHO 2016, Markevych et al. 2017, Tyrväinen et al. 2019). Because of the COVID-19 outbreak different countries enacted restrictions, the close down of public places, rejections for travelling and leisure time activities, reduce of social contacts to slow down the virus spreads. Differences exists how the countries or specific regions put into practice these restrictions. In Finland visiting natural spaces and outdoor recreation areas has been allowed in all times during the covid-19 pandemic.

This study provides insights into how the pandemic has impacted outdoor recreation in Finland. The national outdoor recreation inventory 2019-2021 (LVVI3) provides new knowledge of the use of the forests and natural areas during the period of COVID-19 in 2020. The aim of the national recreation monitoring study is to produce comprehensive and ground level information of outdoor recreation demand in Finland, to monitor long term changes of outdoor recreation, but also to support the sustainable use of natural areas.

The data for this study is based on six survey rounds performed in 2019-2021 (ca. 8600 respondents): rounds 1-2 before the covid-19 in the autumn 2019, and winter 2020, round 3 in the spring 2020, and round 4 in the autumn 2020. Rounds 5-6 were conducted in 2021. The questionnaire in the autumn 2020 included questions targeted to the effects of COVID-19 on outdoor recreation (n=1500). Data consist of a random sample of Finns aged 15 to 80 years. Data collection is conducted in cooperation with Statistics Finland.

Around 96% of Finns annually participate in outdoor recreation. The estimate has been very stable in 20 years' time of outdoor recreation monitoring. There was a small decrease (94 to 91 %) in outdoor recreation participation among the age group 65-80 years in the spring 2020 compared to other time points of the study 2019-2021. This may be linked to the health communication and instructions focusing on citizens over 70 years. In the number of recreational visits, the results show a clear increase during the spring 2020 in all age groups. The respondents living in the cities reported also more frequent use of urban green areas and other managed and constructed outdoor areas than before the pandemic. On the contrary, residents living in the countryside reported less effects of covid-19 on outdoor recreation participation.

Over 70 percent of respondents reported that important motives for outdoor recreation and visiting green areas during the pandemic were engaging with physical activity, beautiful scenery, stress recovery and relaxation, and searching for the silence and peaceful nature as well as enjoying the own time and quietness.

The resilience of a community is reflective to cope with the effects of changed situations and stressed conditions (here pandemic) (Adger, 2006). Green areas and forests have been important for reducing the impacts of covid-19 on residents' wellbeing, especially in urban environment. We need more research on residents' experiences, to identify the group of residents most vulnerable to restrictions as well as information to support the sustainable use of natural environments.

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# 15 Covid-19 as an opportunity to newly discover Switzerland's nature-based cultural landscapes. Qualitative study among German-speaking Swiss holiday guests in Switzerland.

**Lea Ketterer Bonnelame**, **Dominik Siegrist**, Eastern Switzerland University of Applied Sciences Rapperswil, Institute for Landscape and Open Space, Switzerland

**Introduction**

Due to the corona pandemic, many Swiss people stayed in Switzerland in the summer of 2020. According to a survey (SRG & sotomo 2020), in May 2020, 49% had planned longer holidays abroad for summer 2020 and were then tending to change to excursions and shorter holidays in Switzerland due to the changed situation. What the forecasts predicted actually came true: a large proportion of the Swiss population, including many who otherwise travel abroad, spent their main holidays in a Swiss holiday region. Many hotels in the mountain cantons recorded an increase in bookings. The biggest losers were the cities and destinations with otherwise many international arrivals (Nau 2020).

This development was seen in many European countries. Covid has brought about major changes in travel behavior due to closed borders and many people have vacationed in their own country. (YouGov 2020).

Due to that, many Swiss might have got to know their country newly in one way or another in summer 2020. The preference for holidays in one's own country suggests the hypothesis that experiences of nature-based and culture-related tourism were given additional importance. Characteristically, this type of holiday experience takes place in natural areas and nature-based cultural landscapes (Siegrist et al. 2019).

As part of a qualitative survey the changes in perception of Switzerland as a holiday destination, due to the altered starting position of domestic guests because of the corona pandemic, were analysed and evaluated. The questions asked were whether new holiday qualities in Switzerland were discovered, changes in attitudes and activities occurred (Pine & Gilmore 2013) or how cultural and natural attractions visited were perceived.

**Methods**

Due to the complex topic, a qualitative approach was chosen. Unexpected aspects could be better examined with open questions. The disadvantage of the qualitative investigation is that the results may be less representative.

The online survey was carried out with a selection of residents who had spent their vacation in Switzerland in summer 2020. A total of 98 people were interviewed.

The software from provider Kernwert was used to carry out the qualitative survey, who also programmed the questionnaire. The individual questions were implemented using structured and innovative question tools (such as evaluating images, creating collages, etc.). The respondents were involved through the recruiting partner TestingTime.

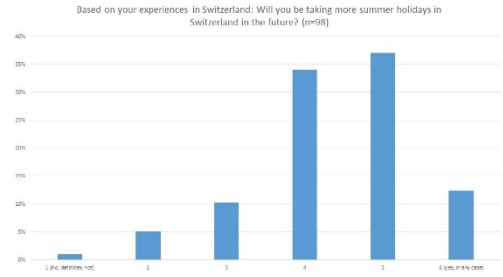
**Results**

The allocation to the guest types (multiple answers possible) shows that the guest type "nature lover" receives most mentions with 54%, followed with 47% by the "sporty guest type" and with 45% by the guest type "city lover". 32% of the responses go to the guest type "interested in cultural attractions" and 23% to the guest type "spa and wellness lover". The guest type "traveler with children", "those interested in history and building culture" and "luxury traveler" received less than 10% of the answers. It turns out that the travellers interviewed were particularly interested in nature and sporting activities.

Most of the respondents mentioned that their holidays in Switzerland were very nice, they had discovered new places and activities and were thus partially compensated for the failed trips abroad. The nature and diverse landscapes in Switzerland, which were discovered on hikes, while biking, swimming, picnicking and barbecuing, were particularly valued. It has been mentioned many times that people are now increasingly appreciating what can be experienced in the immediate vicinity and that many

new things have been discovered that they would otherwise not have come across.

On a scale from 1 (no, definitely not) to 6 (yes, in any case), the majority of respondents (34% for level 4 and 37% for level 5) said they were more likely to be on vacation in Switzerland again due to their experiences. However, only 12% will definitely go on holidays in Switzerland again. What possibly influences this decision can be shown with the results, what was missed most during the holidays in Switzerland: 87% of the respondents state that they have missed the sea, sand and beach. Only 8% did not miss this. In second place, 71% state that they have missed a different climate / different flora and fauna. 69% missed encounters with people / other cultures and 54% missed exotic / other food. Also missing were: cultural attractions (49%), air travel (45%), special activities such as safari, trekking, retreats, etc. (36%), visiting family / friends / acquaintances (35%), sports activities such as surfing, diving, etc. (29%) and pristine wilderness (18%). It turns out that certain very missing factors cannot be compensated for even with holidays in Switzerland.




*Picture 1: Prospective holiday planning*

**Conclusions**

Last summer was marked by new, unexpected holiday experiences for a significant part of the Swiss population and nature-based cultural landscapes provided an essential basis. Some tourists who would have spent their holidays abroad under normal circumstances got to know Switzerland and its diverse natural and cultural values from a new perspective. This gave the various aspects of nature-based and cultural tourism an additional meaning, which will possibly be of sustainable duration. Whether more domestic tourists will be holidaying in Switzerland in the coming years and what effects this will have on the environment, economy and society in Switzerland, however, remains an open question.

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## 106 The effect of COVID-19 on visitation to US forest service wilderness

**Maya Bhadury**[1], **Donald English**[2], [1]University of California at Davis, USA. [2]USDA Forest Service, USA

COVID-19 affected multiple aspects of human behavior in the United States, including choices for outdoor recreation. State-level stay-at-home orders were enacted across most of the country during spring and early summer of 2020. Access to many indoor leisure activities and settings was restricted; outdoor recreation was promoted as a safer alternative, notably in dispersed forested settings to ensure social distancing. Wilderness may have been perceived as especially safe in that it epitomizes uncrowded and natural outdoor settings. Using data from the Forest Service's National Visitor Use Monitoring (NVUM) program, we examine the impact of Covid-19 on visitation volume to Forest Service Wilderness. NVUM results estimated about 9 million visits to Wilderness in fiscal year 2019. The estimate for 2020 was just over 16 million visits. Nearly all the increased visitation occurred from May through September, the last 5 months of the fiscal year.

Our analysis draws on data from 22 national forest units across 11 states that were surveyed from October 2019 through September 2020 (FY2020). Access portals to Wilderness are one spatial component of the sampling framework. Sampling strata are also defined according to the expected volume of daily exiting recreation traffic. Observed on-site counts of exiting traffic are converted to estimates of daily exiting recreation visits.

Our analysis focused on daily visitation rates to designated Wilderness. We differentiated sample days taken throughout the survey year according to whether they occurred (a) before any state-level pandemic-related closures or stay-at-home restrictions, or (b) after any relevant state-wide closures ended. The analysis was performed within each sampling stratum to account for normal differences in visitation patterns across sites caused by seasons and/or days of the week. States in the Southeastern portion of the US did not enact any closures or travel restrictions. As a result, visitation patterns for two forest units in that region serve as a control. Sample sizes for the FY2020 pre-pandemic period were troublesomely small. Tests showed the distribution was not significantly different from visitation counts observed in FY2015 on the same forests, which allowed us to pool the FY2015 and pre-pandemic FY2020 to represent baseline visitation.

Evaluating visitation changes through the lens of statewide orders as opposed to county or forest-level restrictions held two advantages. First, most Wilderness visits come from people who live more than 50 miles from the area visited. So visitors may not be attuned to local guidance. Second, the forest units in our sample largely did not enact forest-level closures and instead opted for use restrictions at developed recreation sites. Given our focus on Wilderness visitation, these closures were not relevant. In addition, some forests that did enact broad closures continued to have visitation to dispersed settings. One surveyor noted, "Dispite [sic] there being a sign at the trailhead saying "National Forest Closed to All" and bright red and yellow ribbons blocking the trail, there were still a reasonably large number of people usimg [sic] the trail."

Internet searches yielded dates for statewide stay-at-home (SAH) orders prompted by Covid-19. For our work, the pre-pandemic portion of the fiscal year runs from October 1, 2020 to the start date of the relevant state SAH order. We assumed visitation patterns during this part of the year followed normal patterns, and thus serve as baseline visitation volumes. The post-closure order period begins on the first Saturday after the relevant state SAH order expiration. We posited that visitation could shift

soon after SAH orders ended; the ensuing weekend could start to see release of pent up demand stemming from the SAH order period. The post-closure period runs until the end of September when data collection on these forest units stopped. For the statis in our study, this period started May 2 in Colorado, Idaho, and Montana; May 9 in California and Pennsylvania; May 16 in Arizona, Louisiana, and Pennsylvania; June 6 in Washington and June 20 in New Hampshire.

Our results show that daily visitation rates were significantly higher after closure or stay-at-home orders ended for all visitation volume strata (Table 1). Across the entire sample, post closure visitation rates were more than twice as high as pre-pandemic rates in High volume locations, and nearly three times higher in low volume locations. Moreover, the patterns of increased visitation differed across visitation volume strata and for weekdays versus weekends/holidays. For High volume locations, visitation rates for both weekend/holidays and weekdays were a little more than double the pre-pandemic rate. For medium volume locations, weekend/holiday visitation rates showed much higher increases than weekdays. Low volume locations had greater increases on weekdays.

In our presentation we discuss regional comparisons and examine the effect of the demographics in nearby populations. The results indicate the role Wilderness plays in the mindset of the American public. We suggest some implications for Wilderness managers.

*Table 1. Average daily exiting visitation to Wilderness, by volume stratum and type of day.*

| | PRE-PANDEMIC | POST-STAY-AT-HOME | T-STATISTIC (P-VALUE) |
|---|---|---|---|
| ***ALL DAYS*** | | | |
| **HIGH** | *111.4* | *221.0* | 3.58 (0.0004) |
| **MEDIUM** | *42.9* | *89.3* | 4.00 (<0.0001) |
| **LOW** | *10.6* | *28.6* | 3.97 (<0.0001) |
| | | | |
| ***WEEKDAY*** | | | |
| **HIGH** | *87.9* | *175.6* | 3.32 (0.0012) |
| **MEDIUM** | *46.1* | *69.7* | 1.72 (0.0856) |
| **LOW** | *8.5* | *31.9* | 4.13 (<0.0001) |
| | | | |
| ***WEEKEND/HOLIDAY*** | | | |
| **HIGH** | *125.8* | *257.9* | 2.63 (0.0097) |
| **MEDIUM** | *39.9* | *121.2* | 3.72 (0.0004) |
| **LOW** | *15.1* | *17.6* | 0.54 (0.5851) |

## 174 The role of outdoor recreation during the COVID-19 pandemic and its impacts on recreational behavior and attitudes towards nature in Finland

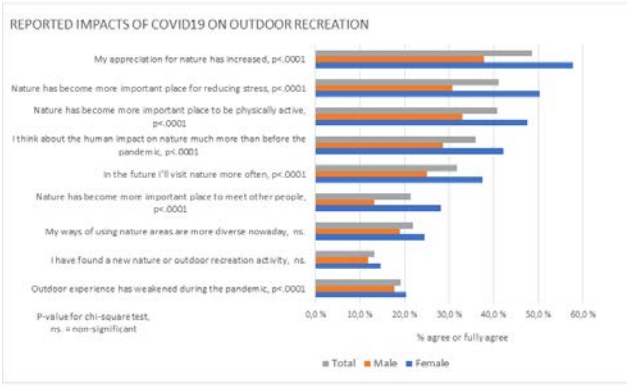
**Liisa Tyrväinen**, **Anne-Mari Sepponen**, **Tuija Lankia**, **Marjo Neuvonen**, Natural Resources Institute Finland (Luke), Finland

The overall participation in outdoor recreation has been high and remained rather stable in 20 years' time of outdoor recreation monitoring in Finland. A long-term trend also indicates slight increase in outdoor recreation visits among the Finnish adult population. Moreover, the importance of health and well-being benefits from nature have steadily increased and boosted at least partly by continued urbanization and adoption of modern lifestyles. These health supporting benefits are also more intentionally sought for among recreationists (Neuvonen et al. 2019, Tyrväinen et al. 2019).

The outbreak of covid-19 pandemic changed globally dramatically everyday life routines and increased in many countries demand for recreation opportunities particularly in urban areas (e.g. Derks et al 2020). In Finland, there has not been any use restrictions of natural areas during the pandemic. The ongoing national inventory of outdoor recreation (2019-2021) gave a unique opportunity to study effects of pandemic of people's outdoor recreation behavior on a national level. In order to understand the importance of green spaces in supporting people's well-being during pandemic, we studied i) how pandemic affects people's recreation behavior and experiences ii) which population groups rely on nature areas the most and iii) what kind of impacts pandemic may have on attitudes and values of people towards nature and outdoor recreation.

The data used in this study was collected in a national outdoor recreation inventory (round 4, LVVI3) in the autumn 2020 that included questions specifically targeting the effects of covid-19 on outdoor recreation (n=1500). Data consist of a random sample of Finns aged from 15 to 80 years. Data collection was conducted in cooperation with Statistics Finland.

The set of questions focused on identifying changes regarding frequencies and patterns in visiting nature during pandemic compared to normal situation. Moreover, we studied to what extent outdoor recreation was found to help in adapting to the changed situation and restrictions set for travelling and spending leisure time and, what kind of access people had to nature during the pandemic. We also investigated motivations to visit nature and, for example, how pandemic may have impacted the appreciation of green areas and access to or attitudes towards nature. Moreover, were interested to know if quality of outdoor recreation experiences changed during the pandemic.




The results show that outdoor recreation participation increased during the pandemic. Nearly half of the respondents reported increased appreciation towards the nature. Clear gender differences in attitudes were found. Female respondents reported higher increase in appreciation towards nature as well as have gained more well-being benefits from nature such as improved stress reduction, possibility for physical exercise and for maintaining social contacts compare to male respondents. Moreover,

female respondent expressed to have more intentions to visit nature also in the future compared to male respondents.

We also found that residents living in cities reported more impacts on covid-19 on their outdoor recreation possibilities and choices compared to residents living in the rural areas. Young respondents (15-24 years of age) reported to have found new outdoor activities more often compared to other age groups. Most frequently mentioned motives for visits were up-keeping physical condition, peace and quietness, beautiful nature landscapes, stress recovery and relaxation and possibility for own time. Two thirds of respondents reported no changes in the use of their typical outdoor recreation area during the pandemic. Every tenth respondent (10%) reported that they had to use another area located further away implying the need for increased travelling and the use of a car, Moreover, 11% of all respondents reported not have been able to visit their typical nature area due to other visitors. Fifth of female respondents assessed that their outdoor recreation experience had weakened during the pandemic.

This study provides insights into the role and importance of outdoor recreation to citizens when adapting to changes during pandemic. The results suggest that good provision of recreation opportunities increases the adaptive capacities of the societies during the pandemic. Moreover, in growing urban areas such as Helsinki MPA increased used of nature during pandemic revealed potential problems linked to supply of green areas if number of users would substantially grow. In consequence, pandemic triggered discussions regarding what is an adequate supply of recreation areas in the future as rather strong compaction city structure and infill on nature areas is anticipated in the whole MPA in the future.

The research results also provide more detailed information on the role of nature areas on human health and well-being during pandemic and help communities to plan mitigation effects of possible pandemic for the future. The study highlights the important role of nature spaces for public health in urban areas. It also supports spatial and management planning of the areas to sustain adequate provision of green areas in changing conditions in the future.

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## 11 Outdoor recreation and nature's contribution to well-being in a pandemic situation - case Turku, Finland

**Nora Fagerholm**, **Salla Eilola**, **Vesa Arki**, University of Turku, Department of Geography and Geology, Finland

Urban green infrastructure provides a range of experiences for people and various health benefits that support human well-being. To increase urban resilience, exceptional situations, such as the COVID-19 pandemic, are important to learn from. This study aims to understand how the residents in Turku, a middle-sized city in Finland, perceived their outdoor recreation changed and how nature contributed to their subjective well-being during the early phases of the COVID-19. Sites of outdoor recreation and associated ecosystem service benefits were gathered through a map-based survey. In addition, the contribution of nature on subjective well-being and the changes in outdoor recreation behaviour were measured. Data was analysed through quantitative, qualitative and spatial methods.

The results show that nearly half of the respondents increased outdoor recreation (41.8 %, n=589) and the majority of outdoor recreation sites (82.6 %) were visited more or as often as before the pandemic. The spatial analysis revealed that the most often visited recreation sites were near forests, semi-natural areas and housing areas as well as relatively close to respondent's residence. Respondents had various reasons for changes in outdoor recreation behaviour. For some a shift to working remotely and changes in everyday routines led to spending time outdoors more often and for some spending less while others avoided recreation in crowded areas due to social distancing. The results also indicate that people's opportunities to adapt to the pandemic conditions differ greatly. The nature's contribution to subjective wellbeing during COVID-19 was important regardless of respondent's outdoor recreation behaviour.

Our study highlights that urban planning should respond to different needs for outdoor recreation in order to widely, and in a just way, promote the well-being benefits of urban nature during a pandemic, and to increase the resilience of the city and its residents. Participatory mapping can capture the variety in resident's values and identify key recreation sites of multiple ecosystem service benefits.

(41.8 %, n=589)

# 43 Changes in children's lifestyle and outdoor activities due to COVID-19 in Japan

**Tetsuya Aikoh**[1], **Akio Shiino**[2], [1]Research Faculty of Agriculture, Hokkaido University, Japan. [2]School of Design, Sapporo City University, Japan

## Introduction

Outdoor activities are essential for children. Experiences of playing contribute to cognitive, physical, social, and emotional well-being among children and are crucial for their holistic development (Ginsburg, 2007). Currently, concerns have been raised about the decreasing opportunities and orientation of children's experiences of nature and its impact on their overall development (Soga et al., 2018).

Particularly, the spread of COVID-19 has significantly impacted citizens' outdoor living and recreational activities. Many countries have recommended or implemented the STAY-AT-HOME principal and social distancing. Administrators have closed parks or restricted the use of some facilities. These measures have led to significant changes in the outdoor activities of citizens (Doubleday et al., 2021). It has also affected the children as schools and kindergartens were closed, and they were encouraged to stay at home.

In Japan, from late February 2020, the number of people infected with COVID-19 increased. The governor declared a state of emergency on February 28 in Hokkaido, where the infection spread faster than in other parts of Japan. The Japanese government abruptly requested the closure of all elementary schools, junior high schools, and high schools starting March 2. Consequently, universities, high schools, elementary and junior high schools, kindergartens, and daycare facilities were closed, and parents had to stay home to care for their children. Although initially, there were no clear guidelines for going out or playing in parks, one week after the school closure, the government announced that outdoor exercise and walking will be allowed. Although there were some differences between areas, schools remained closed until the end of May.

The three-month-long closure of schools restricted children's outings and physical activities and significantly impacted their lifestyles, development, and mental health. In this study, we report on the changes in the lives of preschoolers, elementary school students, and junior high school students and indicate how their outdoor activities were changed during this period of school closure. The study is based on a questionnaire survey of children's parents.

## Method

We asked parents of elementary and junior high school students and preschoolers to respond to a questionnaire starting on March 19, 2020. The URL of the online questionnaire site was sent to the mailing lists of the Society for Children's Environment, Association of Private Kindergartens, and other organizations and social media platforms. Overall, we received 923 responses until April 1.

The questions items covered the status of school closure, changes in children's lives, the need for outdoor activities, playgrounds before and during COVID-19, and challenges faced by parents.

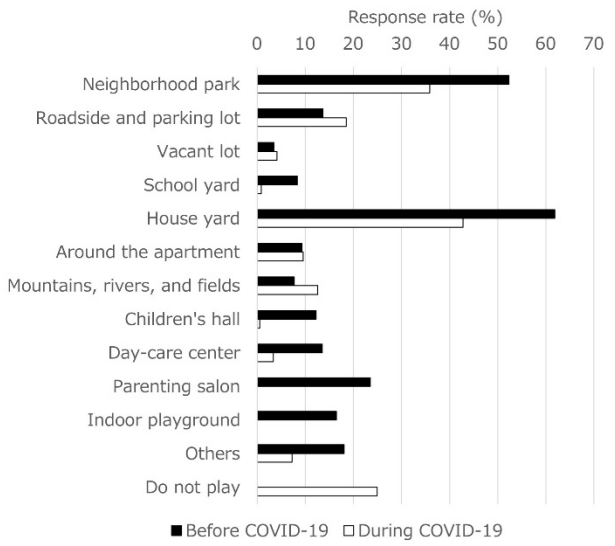


Fig.1 Children's outdoor play locations before and during the COVID-19

**Results**

Seventy-eight percent of the respondents' children were not in school, and five percent of the children experienced reduced school hours. Due to the school closure, the children spent more time on indoor activities, such as playing videogames and indoor games and watching TV and videos, and less time on outdoor activities, such as playing outside or meeting with friends. The most common places for playing outdoors were home or friends' gardens and neighborhood parks. In addition, there was a slight increase in the number of children playing in the mountains and at rivers and fields compared to the pre-COVID-19 period.

Fifty-seven percent of the parents considered playing outdoor to be as necessary as usual, and twenty-six percent said it was more necessary than usual. However, more than half of the parents experienced a lack of information about safe places for their children to play outdoors.

**Conclusion**

During the school closure, since outdoor play options had decreased, the children spent most of their leisure time indoors. A study of children and adolescents in Canada reported decreased physical activity and increased sedentary behavior (Moore et al., 2020). Since the school closure lasted for three months, we are concerned about the impact on the children's development. While most children played in their yards or in the neighborhood park, the number of children who played outside, in the natural environment increased. This might be because both children and parents avoided crowded neighborhoods and sought areas with a low population density, such as mountains, forests, and rivers in suburban areas.

Many parents wanted their children to play outside, despite the pandemic. Further, while the government encouraged them to explore less crowded places, the parents lacked relevant information on such locations. Therefore, government agencies and park administrators should provide information on the location of parks and natural outdoor environments with lesser crowds for children to play.

# 41 Changes of tourism under impact of COVID-19 pandemic in Stołowe Mountains and Karkonosze Mountains National Parks, south-western Poland

**Mateusz Rogowski**, Adam Mickiewicz University, Poznan, Poland

National parks are important tourist destinations because of their high bio- and geodiversity values that enable outdoor activities and leisure in natural environment. This is vibrant issues because the COVID-19 pandemic restrictions have limited leisure in natural environment. This presentation highlights the outcomes of the survey conducted on visitors behaviour and motivations during national park visits at the time of the COVID-19 pandemic in 2020. The research was conducted in two mountain national parks located in south-western Poland, i.e., Stołowe Mts. National Park (SMNP) and Karkonosze National Park (KNP), both located in the Sudety Mountains along the Polish-Czech national border. The study identifies intentions of visitors' behaviour change in comparison with the 'pre-COVID-19' period, i.e., 2017-2019. The study aimed to determine the factors that influence the mountain national park visits. Specifically, the surveys were used i) to assess spatio-temporal changes of visitors, distribution in two national parks, including changes in seasonality of tourism and frequencies of main tourism attractions sight-seeings; i) to characterized changes in motivations and behaviours of park visitors during the pandemic period in comparison to the 'pre-COVID-19' period.

**Material, methods**

The research was conducted during the European COVID-19 pandemic period, i.e., from April to December 2020. The surveys were collected remotely using electronic questionnaire-based data collection of visitors' motivations and behaviour. The visitor flow data were acquired via infrared Eco-counters sensors in SMNP (Rogowski 2020) and entrances fees basis during the period 2017-2020.

| MONTH (THOUSAND VISITORS) | STOŁOWE MTS. NATIONAL PARK | | | KARKONOSZE MTS. NATIONAL PARK | | |
|---|---|---|---|---|---|---|
| | 2019 | 2020 | Change 2019/2020 | 2019 | 2020 | Change 2019/2020 |
| **JAN** | 3.9 | 18.5 | +381.5% | 114.1 | 113.2 | -0.8% |
| **FEB** | 9.4 | 17.7 | +88.5% | 138.2 | 125.6 | -9.1% |
| **MAR** | 15.3 | 9.5 | -38.1% | 57.6 | 28.3 | -50.8% |
| **APR** | 58.9 | 6.1 | -89.6% | 84.4 | 2.8 | -96.7% |
| **MAY** | 140.8 | 60.6 | -57.0% | 169.8 | 66.3 | -61.0% |
| **JUN** | 128.2 | 112.9 | -11.9% | 200.6 | 154.2 | -23.2% |
| **JUL** | 168.5 | 244.8 | +45.3% | 320.7 | 372.1 | +16.0% |
| **AUG** | 209.9 | 230.2 | +9.7% | 376.7 | 376.0 | -0.2% |
| **SEP** | 89.0 | 121.2 | +36.2% | 181.9 | 253.7 | +39.5% |
| **OCT** | 61.7 | 56.0 | -9.2% | 116.9 | 117.6 | +0.6% |
| **NOV** | 23.2 | 25.7 | +10.5% | 39.3 | 39.9 | +1.5% |
| **DEC** | 10.6 | 11.6 | +9.5% | 60.9 | 48.0 | -21.2% |
| **YEAR** | **919.3** | **914.8** | **-0,5%** | **1 861.1** | **1 699.5** | **-8.7%** |

*Table 1. The comparison of monthly amounts of visitors recorded by infrared sensors in the Stołowe Mts. National Park and Karkonosze National Park in the pre-COVID period (year 2019) versus the COVID-19 period (year 2020).*

**Results**

Annual number of visitors in both national park has a little change between the pre-COVID period (year 2019) versus the COVID-19 period (year 2020) (Table 1). However, monthly amounts of visitors during the COVID-19 period were lower than in the previous years (2017-2019). The highest decrease of visitors was noted in April and May, i.e., during the implementation of a complete lockdown in Poland. The highest increase of visitors between the pre-COVID and the COVID-19 period was noted in July and September. Furthermore, the highest numbers of visitors were recorded in July and August, i.e., during high summer season period, when lockdown was not present (Tab. 1).

A total of 936 (i.e., 540 women, 396 men) questionnaires were received from the two national park visitors. In total, 40.3% of respondents (n = 337) indicated that the pandemic has impacted their visits to both or individual national park. However, majority of respondents, i.e., 59.7% (n = 559), indicated that the pandemic has not affected their plans to visit the national parks. The pandemic had the biggest impact on visitors' choice on source of gastronomic services. 18.2% of respondents (n = 170) confirmed that they have changed their choices on gastronomic services. The pandemic had the smallest impact on visitors' plans modification on tourists attraction choices. Only 15.6% of responders (n = 146) indicated that the pandemic has induced changes in theirs choices of tourist attractions visits. The surveys revealed that the pandemic had the smallest (i.e., 12.5%, n = 117) impact on the responders choices on the accommodation service.

Visitors' surveys enabled to distinguishing three groups of visitors with different impact of pandemic on their behavior:

1. High fear (n = 16.9% of responders), perceives the severity of the pandemic in choices of tourists attractions, accommodation and gastronomic services,
2. Low fear (n = 23.4% of responders), with changes in behaviour were related in choices of tourist attractions or accommodation or gastronomic services;
3. No fear (n = 59.7% of responders): The visitors in this group has indicated that the pandemic has not changes they overall behaviour related to national parks visits.

**Conclusions**

The main outcomes from the research are:

1. During the COVID-19 pandemic the seasonality of the visitors flow in both national parks was changed. The length of the high season has decreased by two months during the pandemic and the highest tourist load was observed in July and August 2020. Whereas, an increase in low-season duration was observed and that season has lasted five months, i.e., from November 2019 to April 2020. Additionally, a delay in spring mid-season was observed and that season was noted from May to June 2020.
2. Visitors behaviour in the year 2020 has changed in comparison to the pre-COVID-19 period. The frequency of visits in both national parks has decreased but the length of the stay has increased. Most frequently reported type of visit in both national parks were related to family visits, that have used an individual accommodation facilities. An increase of visits to the secondary-order tourist attractions was observed during the pandemic. At the same time, a decrease of visits in the main tourist attractions in both national parks was noted.

**Follow-up**

The outcomes of this study can be used by park managers in order to create a sustainable tourism in the post-COVID-19 pandemic period. Furthermore, the outcomes of this study can supply the local policy makers in adjusting the local economy and regulations to the post-pandemic period.

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# 127 Changing visitor influx during the covid-19 pandemic. The case of Serra de Collserola Natural Park, Barcelona.

**Estela Inés Farías-Torbidoni[1]**, **Serni Morera[2]**, **Victor Dorado Martínez[2]**, **Seán Cahill[3]**, **Josep Oriol Soler Casas[3]**, **Màrian Navarro Navarro[3]**, **Isabel Raventós Gaston[3]**, **Marta Doñoro Moya[3]**, [1]National Institute of Physical Education of Catalonia (INEFC). University of Lleida. Spain. efarias@inefc.es, Spain. [2]National Institute of Physical Education of Catalonia (INEFC). University of Lleida. Spain., Spain. [3]Consorci del Parc Natural de la Serra de Collserola., Spain

**Introduction**

Proper and effective management of public use in protected natural areas (PNA) is closely linked to having an updated diagnosis of their state. The duty to conserve, implicit in these kinds of areas, requires having sufficient information to justify decision-making.

According to Leung et al. (2015), Cessford & Muhar (2003), between a long list of authors, three basic kinds of data need to be considered: 1) the influx of visitors, understood as the total number of users who visit the PNA annually; 2) the recreational, sports and tourist use of the area, which summarizes the number and distribution of user-visits, including the characterization of the different activities carried out during visits; and 3) the profile of the user-visitors.

In the case of peri-urban PNAs, such as the Serra de Collserola Natural Park (SCNP), which is also a Natura 2000 Special Area for Conservation (SAC), this kind of information is even more necessary and relevant due to the intense pressure these sites tend to experience, not only in terms of visitor influx but also in terms of the diversity of uses that occur there and also considering their importance from a nature conservation perspective.

The SCNP occupies an area of about 8,259 hectares (seventeen kilometers long and six kilometers wide) and is located in the middle of one of the densest urban areas on the Mediterranean coast. It was declared as Natural Park in 2010. More than 350 km make up the main trail network, including large and small forest tracks. Unlike other natural parks in the environment, SCNP includes Natural Reserves within its territory, which increases the level of complexity in the management of public use in such highly populated environments. According to data available, during 2019 SCNP received almost 5.000.000 visits (Farías & Morera, 2020).

In this context, during 2017, 2018, and 2019 the SCNP Consortium carried out the first diagnosis related to the influx, frequentation, and characterization of the users-visitors of this Natural Park-SAC, including the development of a robust and effective monitoring protocol based on the use of eco counters.

One year later, this monitoring system was especially relevant when the COVID-19 pandemic led to the majority of the countries imposing lockdown measures and limiting people's movement throughout 2020, changing their usual behavior and generating some overcrowding in specific areas. The purpose of this paper is to examine the utility of this monitoring protocol for measuring changes in visitor use that emerged due to COVID-19.

**Methodology**

The design of the influx protocol system was based on the consideration of three main steps: 1) identification of the main entry or exit points of the Park; 2) typification of the main movement flows and 3) installation and calibration of the eco counters.

As a result of the implementation of 120 fieldwork units carried out in three phases. The final protocol system was based on, as shown in Figure 1, the consideration of 46 main entry or exit points (park gateways), grouped visitor flux in 10 main unit sectors (drive units), and the installation of 13 eco counters.

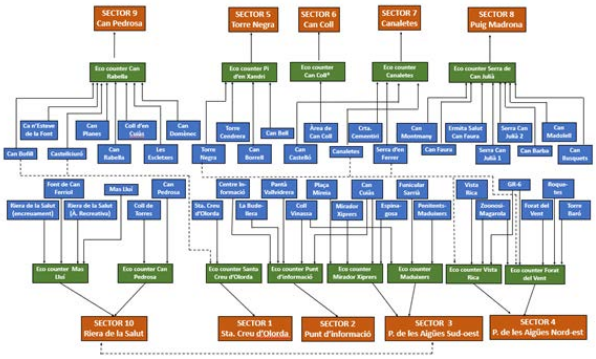


*Figure 1. General flow chart between sampling points and eco counters*

*The following equation was used to calibrate data obtained from the eco counters.*

$$\text{Calculation formula} = \frac{VDC - VDT}{2} + VDT + VND + VNA + VL$$

VDC: Visitors Detected by the Counter
VDT: Visitors Detected by the counter that only cross it once
VND: Visitors Not Detected by the counter
VNA: Visitors accessing to the park by Nearby accesses
VL: Visitors with Local activities (extraction of products)

## Results

The comparison of the results obtained during the 2019-20 period showed important changes in terms of influx, distribution, and uses. According to eco counter data, the SCNP showed a record number of visits during 2020, calculated at 6.276.322 visits. This figure is more than 1.200.000 visits higher than during the previous year, which represents an overall increase in visitors of 26%. This increase is even more significant if we consider that during March and April, as a result of the initial COVID-19 lockdown, the influx into the Parc territory was substantially reduced, with a peak decrease in April of 70%. Table 1.

| | Number of visits | | % variation 2019-20 | | |
|---|---|---|---|---|---|
| **Month** | **2019** | **2020** | **Global influx** | **MTB activity** | **Foot activity** |
| **January** | 351933 | 397705 | 13% | 9% | 3% |
| **February** | 378996 | 466143 | 23% | 13% | 6% |
| **March** | 485830 | 275705 | -43% | -51% | 10% |
| **April** | 426354 | 126763 | -70% | -78% | 20% |
| **May** | 498737 | 908956 | 82% | 105% | -2% |
| **June** | 450134 | 714603 | 59% | 71% | 0% |
| **July** | 369363 | 526104 | 42% | 38% | 2% |
| **August** | 322028 | 385176 | 20% | 28% | -4% |
| **September** | 494565 | 603951 | 22% | 21% | 2% |
| **October** | 453508 | 684164 | 51% | 54% | 2% |
| **November** | 376415 | 630187 | 67% | 108% | -11% |
| **December** | 380917 | 577997 | 52% | 69% | -6% |
| **Total** | 4988781 | 6297454 | 26% | 32% | 20% |

*Table 1. Comparison 2019-20 influx in SCNP*

A more detailed analysis of the variations in influx over the year shows other substantially relevant alterations linked to the mobility restrictions experienced during 2020. An unprecedented increase during May, just after the end of lockdown measures, of almost half a million visits, made it clear that the overall behavior of use of the Park had been altered in response to a cumulative need for outdoor recreation and nature.

During May the Natural Park registered a total of 908.956 visits, which represents an increase of about 82% over the previous year, followed by another peak located in November, with a 67% increase, which matches with the first month of county-level perimeter closure. It is also worth highlight that mountain biking was the visitor activity which increased most during this year, with an overall increase of 32%, while visits on foot increased by only 19%.

The Park entry points located close to the city of Barcelona: Puig Madrona, Can Rabella, and Riera de la Salut, were the ones which registered the highest increases in visits, thus confirming, the importance of these kinds of PA as important places for recreation and contact with nature, and especially for the inhabitants of urban environments.

## Conclusion

The ever-increasing number of visitors raises significant challenges for nature conservation in peri-urban PNAs. In consequence, there is an urgent need for suitably managed monitoring of visitors to Natural Parks, which must be replicable year by year, using a simple system with correct calibration.

The results shown in this paper demonstrate the possibility for achieving three different kinds of data: number of visits, territorial distribution, and changes in visitor use, thanks to a very simple system based on a relatively low number of eco counters (13 in total), providing these are correctly interconnected.

## Acknowledgment

This study was carried out with the financial support of Barcelona Municipality and the Consorci del Parc Natural de la Serra de Collserola.

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# 131 Impacts of lockdown on the management of Brazilian National Parks

**Louise Gunter de Queiroz**, **Teresa Cristina Magro Lindenkamp**, University of São Paulo, Brazil

What did the current pandemic represent for park managers in Brazil? This pandemic certainly created negative consequences for 'costumers' (visitors). But does this mean as well for conservation? Based on interviews sent to the 74 managers, we present an overview of the impact of Covid-19 at management of Brazilian National Parks.

**Closing the Parks**

Following the guidelines of the World Health Organization to maintain social distancing to contain the pandemic, the Brazilian government decided to close all National Parks from March 17, 2020 for the public. In addition to recreational activities, fieldwork conducted by researchers from other institutions has also been suspended.

Three months after its closure, some parks began the gradual reopening process for visitors and researchers. With great regional differences and completely different biomes, the managers followed a protocol, but each park had to deal with different pressures.

Tourism had to adapt to this new reality: few customers. Even if the parks could open their doors tomorrow without any restrictions, they would face a shortage of visitors in the short and medium term. Does the number of visitors will recover one day to the pre-pandemic levels? Many uncertainties have arisen with the birth of a new normal, the-one-and-a-half-meter society. Air travel - both international and domestic - tends to decline. Maybe forever. This not only brings great changes for the tourism sector, but also for Parks whose management is strongly based on the number of visitors. Some believe that the valorization of Brazilian national ecotourism is the way out, as social distance would be easier to implement. Is it realistic? We believe that ecotourism flow in the future turns out to be lower than the pre-pandemic level and this forces the Parks to adapt to fulfill their agendas related to public use.

**Environmental conservation amid pandemic Covid-19**

At a global level, during the pandemic, the protected areas had a reduction in the number of visitors, making it possible to benefit from some positive effects related to a reduction in impacts on the environment including the lower risk of running over animals. Sharma (2020) reports positive results such as a lower level of pollution in the air and water, a drop in greenhouse gases and the recovery of the natural space by wildlife.

However, a closer look suggests that the impacts of the pandemic are not merely positive. Buckley (2020) points out two possible unwanted side effects of the pandemic for conservation: i) increase in poaching due to reduced income from tourism; and (ii) extractive companies can opportunistically and through multiple mechanisms, have access to public domain resources inside protected areas.

**Some results**

This survey had an online questionnaire, addressing 25 questions structured in: 1) Basic information; 2) Execution of activities; 3) Pressure to reopen; 4) Infractions after the parks closed; 5) Visualization of fauna by employees ; 6) manager's position during the mandatory closure of the park. Of the total of 74 Parks, 44 managers sent their responses.

Thirty of the 44 parks that replied the survey did not have a reduction in their working hours. Some of them had problems adapting to the new reality, others were successful and were able to set up virtual meetings or participate in distance learning courses. The new reality has even benefited a surprising number of Parks, mainly in the Amazon region. The Internet is helping and facilitating its operation, as these Parks have precarious access sometimes only by boat. Traveling is expensive and time-consuming.

**Threats**

With the threat of the Brazilian economy shrinking, it was expected that this scenario would have a negative impact on ICMBio, the Federal Agency that manages National Parks. The results do not confirm this hypothesis for now. In 90% of the parks, the staff has not changed. In the medium term, there is a potential risk of shrinking in sectors linked to nature tourism, as a 40 to 50% reduction in the visitation rate in Brazilian Parks is expected.

In general, tourism inhibits illegal actions in protected areas. It was evident that the mandatory closure of the parks promoted an increase in the presence of poachers according to the managers' report. Likewise, there has been an increase in fishing, both recreational and as a source of income (Figure 1). Mining has also increased. They also emphasize that parks that do not control the entry of visitors lead to intense and disordered use. This condition, combined with the lack of land tenure regularization, represents a favorable scenario for infractions.

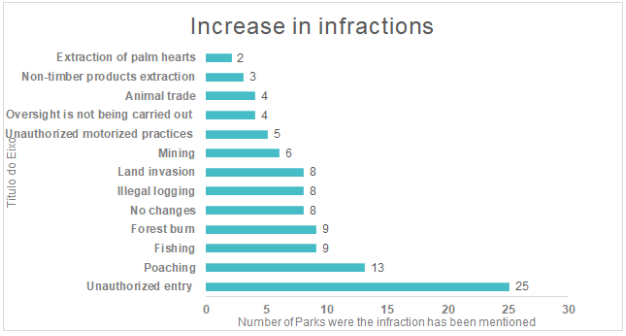


*Figure 1: Increase in infractions during the pandemic in the Brazilian National Parks*

The most cited negative effects were the interruption of scientific research and projects with the local comunities. In many regions where tourism is the main driver of the local economy, the impact with lost revenue has been great. Other impacts cited: the lack of opportunities to use the available financial resources due to the lockdown; lack of outdoor spaces for the population to practice activity; growing demotivation among the indigenous population; accumulation of work in trail maintenance. On the closure of national parks: only 5% of managers did not agree with the closure and 76% did.

After our survey we believe that ideal scenario would be to reopen the parks for the residents of the area where they could recreate and get in contact with nature respecting social distancing of 2 meters. In parks with the presence of indigenous people, riverside dwellers and quilombolas, a partial opening should occur with the restriction of external visitors in areas with local residents.

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# 59 Small nature-based tourism firms and their ability to cope with major external changes exemplified through Covid-19

**Rita Moseng Sivertsvik**, Ruralis - Institute for Rural and Regional Research, Norway

**Introduction**

Within tourism, resilience is often understood as relating to a firms or destination's ability to be robust in the face of change and the strategies they follow when the framework conditions shift (e.g., Cheer and Lew 2018; Hall, Prayag and Amore 2018; Prayag 2018). As Prayag (2018:133) notes, adapting from Holling (1973), «ideas of resilience are related not only to change but also to stability and response». The Covid-19 pandemic presents one such challenge that has significantly tested the resilience of the tourism sector and places where tourism is important. It has also exacerbated tourism trends established prior to the outbreak, notably a shift away from mass tourism linked to major commercial sites, towards smaller scale, more authentic and unique tourist experiences.

In this paper we discuss, based on interviews with small firms in the nature-based tourism (NBT) sector before the pandemic hit, to what extent such firms might have special advantages in responding to major external challenges like Covid-19. Although these interviews were conducted before the outbreak of Covid-19, they covered topics salient to the issue of resilience to external challenges. These firms were chosen because they have been key actors in creating authentic quality tourist experience which extend beyond the specific nature-based product. This can be illustrated through the theory of performativity (e.g., Edensor 2000; Wang 1999), what Crouch (2012:19) defines as «doing tourism». A performative approach can include both the tourist and the provider, with focus on the moments, the acts, the feelings, and the relationship – both with nature and the people who are involved in «doing» tourism (Ibid.). Several of these small NBT firms are characterized by the presence of managers, guides, and other staff as part of their product. The performative is thus about how the provider facilitates how the tourist encounters different spaces – destinations or sites, and how the provider creates these spaces, which are unstable, shifting and continuously under construction. Knudsen and Waade (2010:12-13) states that «places are something we authenticate through our emotional […] relatedness to them», and that it is «a relational quality attributed to something out of an encounter» (ibid.:13). The characteristics and adaptions of these NBT firms – offering more unique and decentralized experiences, are important both as a response to mass tourism and to the challenges posed by Covid-19. In particular the presence of small NBT firms, and their specific business characteristics might improve the resilience of places or regions with limited economic sectors or where other key sectors are impacted by a crisis or downturn.

**Methodology**

The empirical data for this paper is taken from 24 semi-structured interviews with managers of NBT-firms carried out in 2017 and 2018 as part of the BIOTOUR-project (2016-2021). Most of the firms can be classified as small, with less than five employees, with several of the managers also being the firms' owners. The informants were from three different geographical regions in Norway; Varanger, Trysil and Hardanger. Each region has a unique socio-economic and tourism context which shaped the different types of NBT-activities that were developing. Varanger is an arctic and relatively new tourist destination in the eastern part of Northern Norway, most known for attracting both national and international birdwatchers over the last ten years. Trysil is a traditional forest and agricultural community in the eastern part of Southern Norway, now one of Norway's largest ski destinations. Hardanger is a fjord and mountain area in the western part of Southern Norway with a history as one of Norway's most profiled tourist regions.

**Results**

Our analysis highlights that NBT firms seem to hold qualities that make them well equipped for coping with the changes caused by the Covid-19 pandemic. They have developed a business model, market niche and specific tourist experiences that mean they are

less dependent on a large tourist flow and impacted by external challenges. A number of interlinked strategies contribute to ensuring the economic sustainability and resilience of NBT firms. Firstly, because of the seasonal nature of the work, many of these actors need to combine their NBT-activity with other work and are thus not so vulnerable to sudden changes in one economic sector alone. Secondly, because the NBT-firms are located in rural areas, often with a small and partly scattered population, they are often dependent on collaborating with other actors to offer packages to tourists, contribute to seasonal equalization, keep tourists in the area for a longer period and ensure the quality of the products. These developments have taken place in most tourism regions in the last ten years. Collaboration allows tourist experiences that are richer in content, and a larger range of offers and areas in the regions are used. Thirdly, the firm managers have chosen strategies to avoid «people pollution», which will be negative for the nature experience, by increasing the quality and price by specializing in one field. Furthermore, this means that the small-scale NBT-firms become a contrast to mass tourism with differentiated offers, and their specially adapted products that reduce group sizes, in the context of Covid-19 also thus reduce the risk of infection spreading. Overall, these factors provide increased economic resilience. The NBT-firms are better prepared to tolerate recession and fewer visitors do not impair the quality of the product, which is based on facilitating the development of the performative – to create relations with the tourists and ensure a unique experience.

For the future development of this paper, we will complement the empirical material through follow-up interviews with a selection of the same firms focusing on their experiences and strategies in coping with the Covid-19 pandemic.

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# Recreation, tourism and wildlife disturbance: a human perspective

| SESSION | PART | DATE | TIME | CHAIRS |
|---|---|---|---|---|
| 1B | I | Tuesday 17th August | 14.00 – 15.20 CET | Léna Gruas |
| 2B | II | Tuesday 17th August | 15.40 – 17.00 CET | Hilde Nikoline Hambro Dybstad |
| 3B | III | Tuesday 17th August | 20.00 – 22.00 CET | Hilde Nikoline Hambro Dybstad & Léna Gruas |
| 7B | IV | Thursday 19th August | 12.00 – 13.20 CET | Léna Gruas & Hilde Nikoline Hambro Dybstad |

| | Programme |
|---|---|
| *1B* | **28** Mapping the distribution of outdoor activities to assess their impacts on capercaillie (Tetrao urogallus) – Evidence from user-generated geographic information |
| | **27** Outdoor sports, leisure and recreational activities is considered a main pressure for achieving European nature conservation targets |
| | **115** Wildlife disturbance caused by nature sports: an overview from general to specific |
| | **54** Disturbance caused by recreational activities -Case study Regional Nature Parc Beverin (RNPB), Switzerland |
| *2B* | **61** Media representation of nature, mass ecotourism, and the visitor experience |
| | **177** Staging the wild: Photographers' behaviour and attitudes towards the use of bait, hides and landscape modifications in large carnivore photography |
| | **183** Between a rock and a hard place: How nature guides in Arctic Svalbard navigate conflicting norms |
| *3B* | **31** Cold as Ice? Arctic tourists' epiphanies and connection to wildlife |
| | **149** Towards a model for the assessment of conservation, welfare, and governance in wildlife tourism attractions |
| | **121** The recreation ecosystem: A social-ecological systems application for recreation ecology highlighting wildlife |
| *7B* | **134** Why are some species more popular with wildlife tourists: Insights from South Africa. |
| | **91** Interpretation in Ásbyrgi: communicating with National Park visitors in Iceland |
| | **20** Snorkeller attitudes and behaviours at two popular sites in Ningaloo Reef Marine Park, northern Western Australia. |
| | **25** Centrality to life and the Theory of Planned Behavior: The case of musk ox safaris in Dovrefjell-Sunndalsfjella National Park, Norway |

# 28 Mapping the distribution of outdoor activities to assess their impacts on capercaillie (Tetrao urogallus) – Evidence from user-generated geographic information

**Leonie Schulz**, **Martin Price**, Centre for Mountain Studies, Perth College, University of the Highlands and Islands, United Kingdom

**Introduction**

The most severe effects of outdoor tourism/recreation (**OTR**) are habitat fragmentation, modification, and loss, which affect animal behaviour, survivorship, distribution, and reproduction (e.g.: Karlson & Mörtberg, 2015; Monz, Pickering, & Hadwen, 2017). A highly used path can create a barrier and lead animals to avoid a much wider area through trail-edge effects (Monz et al., 2017; Moss et al., 2014). Capercaillie (Tetrao urogallus) respond differently to different OTR activities, e.g., they avoid mountain-bike trails up to 1091.5m and winter infrastructure up to 327.1m (Coppes et al., 2017). Along multi-use tracks, capercaillie use trees closer to tracks in less visited woodland than in highly visited woodland, with tree use asymptotes of 197m and 291m, respectively (Summers et al., 2007). The present study assessed 1) patterns of recreational uses, 2) functional habitat loss of capercaillie due to trail-edge effects, 3) the impacts of OTR on lek site selection, and 4) the potential for capercaillie refuges.

**Methods**

This study was conducted in Badenoch and Strathspey, in the western part of Cairngorms National Park, Scotland. This area was selected because of its popularity for OTR (CNPA, 2015), and has 83% of the remaining capercaillie population in Great Britain (Wilkinson et al., 2018).

User-generated geographic information (**UGI**) was harnessed from four tracking applications: Strava, MapMyFitness, Wikiloc, and AllTrails. To analyse the most recent distribution of the most popular activities, individual GPX routes of mountain-biking, walking, and running from the year 2019 were downloaded and converted into shapefiles for subsequent spatial analyses in GIS in relation to capercaillie lek sites (Kortland & Doubleday, 2019). First, trail-edge effects were 'erased' from woodland layers (SNH, 2018) to calculate the number of lek sites within undisturbed woodland. Then, a Fishnet grid was used to assess the use intensity from 0 (=no activity) to 6 (=very high intensity) of on- and off-trail activities in the 2.25km² grids with lek sites. Finally, use intensity layers were overlaid with woodland layers ('erased' by infrastructure buffers) to identify capercaillie refuges.

**Results**

Mountain-biking was largely woodland-based, with much lower use levels on open, high ground. Off-trail analysis revealed that visitors were more likely to go off-trail in more crowded areas. 96% of the mountain-biking routes were on-trail, compared to 89% of walking and 90% of running routes. However, the highest density of off-trail activities near lek sites occurred in a mountain-biking area.

After 'erasing' trail-edge effects, only 39% (41% in spring) of established woodland, and 45% (44% in spring) of young woodland remained undisturbed by mountain-biking; these woodland areas were less disturbed by walking and running. More than half of the capercaillie lek sites (52.6%) were inside, and 96.5% within 200m of, undisturbed areas, demonstrating the species' avoidance of disturbance.

Assessment of use intensity levels near lek sites showed that 38.6% and 50.9% of the sites were in areas of no walking or running activity, respectively. Due to the wider distribution of mountain-biking, fewer lek sites were within areas of no mountain-biking activity (8.8%). However, 57.9% were within areas with a very low to low intensity of mountain-biking. There was a relatively high number of lek sites in medium-low to medium-high intensity areas for all three activities. This was attributed to the high quality of preferred capercaillie habitat in these areas. By combining woodland cover and use intensity levels, important capercaillie refuges were identified in six woodlands (Figure 1).

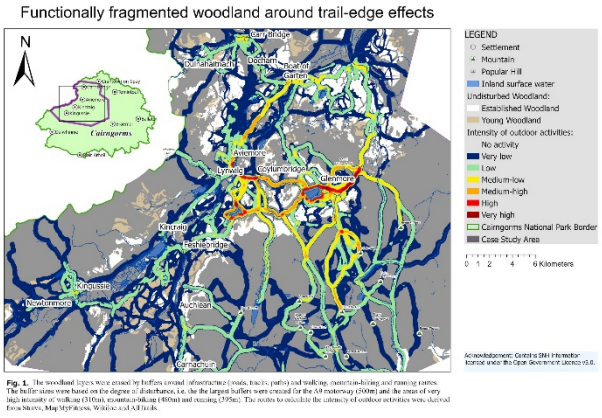


*Figure 1.*

## Discussion and conclusions

This research used UGI to investigate different levels of intensity of mountain-biking, running, and walking, to quantify spatial overlaps between OTR and capercaillie leks. While mountain-biking caused the highest functional habitat loss, mountain-bikers mainly used official trails, rather than going off-trail, as found previously (Monz & Kulmatiski, 2016; Nogueira Mendes et al., 2012). The ability to assess and predict the locations of, and reasons for, off-trail use close to capercaillie lek sites can help to identify appropriate management strategies for minimising unwanted disturbance during the reproduction and chick-rearing season (Norman & Pickering, 2019; Thiel, 2007).

The study also shows that capercaillie select leks in relation to both disturbance from outdoor activities and the availability of a high cover of established woodland. This confirms the results of previous studies (Jäger et al., 2020; Rösner et al., 2014; Summers et al., 2007), and shows that it is important to establish wildlife refuges in areas where disturbance from outdoor activities can be minimised because their levels are already low (Beeco et al., 2014; Henkens et al., 2006; Job et al., 2014) and woodland cover is high (Coppes et al., 2018; Summers et al., 2004).

This study showed that wildlife refuges can be identified by analysing UGI. The strength of this approach is the high level of spatial resolution of visitor data. However, as UGI only represent a small number of users (Jäger et al., 2020), the distribution and popularity of areas are relative rather than absolute, and such approaches should be used in combination with conventional visitor monitoring methods.

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# 27 Outdoor sports, leisure and recreational activities is considered a main pressure for achieving European nature conservation targets

**Rogier Pouwels**[1], **Anne Schmidt**[1], **Ruud Foppen**[2,3], **André van Kleunen**[3], [1]Wageningen Environmental Research, WUR, Netherlands. [2]Department of Animal Ecology and Ecophysiology, Radboud University, Netherlands. [3]Sovon, Dutch Centre for Field Ornithology, Netherlands

**Introduction**

Protected areas are one of the major strategies to conserve biodiversity. Still many habitats and species occurring in these areas are under threat due to pressures from within as well as outside these areas. One of these potential pressures is disturbance by human activities like sports, tourism and other recreational activities. As these activities are increasing in most protected areas, conflicts between outdoor recreation and nature conservation have also increased. In order to take adequate measures, managers need scientific knowledge on the nature and severity of the impact of these human activities on conservation targets (McCool 2016). However, scientific knowledge is inconclusive, and often based on studies that take into account few habitats or species.

In Europe the Habitats and Birds Directives (HBD) are the main nature conservation policy instruments to safeguard Europe's diversity of wild plants, animals and landscapes. The aim of the HBD is to protect the most vulnerable habitats and species in Europe. Their conservation status assessed every six years according to a standard protocol. The assessments show that for many habitats and species the conservation status is still 'unfavourable'. This unfavourable conservation status is caused by a multitude of pressures and threats. Agricultural activities and urbanization are the most frequently reported pressures and threats for both habitats and species.

**Method**

The information of the assessments is stored in two databases that are available on websites of the EU. The databases from 2015 contain information on the conservation status of 231 habitats, 1319 species (other than birds), 335 breeding bird species, 231 migratory bird species and 151 wintering bird species. For the habitats and species (other than birds) the conservation status is assessed for each biogeographical region and country the species is present. For bird species the information is available for each country and season in which it is present. As part of the assessment, experts indicate which pressure (currently) or threat (in the future) might lead to an unfavourable conservation status. Experts are able to choose up to 10 pressures and 10 threats from a predefined set of 79 main pressures/threats, which are grouped in 13 categories. Outdoor sports, leisure and recreational activities (code: G01, in short 'recreation') is one of these pressures/threats. Some of the pressures/threats are divided in up to 55 sub-pressures/-threats, but for our analyses we focused on the 79 main pressures.

**Results**

The habitats database contains 64,826 records of pressures for a combination of habitat/species, country and region. The bird database contains 14,609 records of pressures for a combination of species, season and country. Regarding the 13 categories, pressures related to agricultural activities are selected most often. However, data on the 79 main pressures show that recreation (G01), is selected most often for rocky habitats, breeding and wintering birds. For coastal habitats, dune habitats, sclerophyllous scrubs, mammals, vascular plants and migratory birds recreation ranks in the top five (Table 1).

| | | # | rank G01 |
|---|---|---|---|
| habitats | Bogs, mires & fens | 12 | 9 |
| | Coastal habitats | 28 | 2 |
| | Dunes habitats | 21 | 3 |
| | Forests | 79 | 9 |
| | Freshwater habitats | 19 | 8 |
| | Grasslands | 31 | 9 |
| | Heath & scrub | 12 | 6 |
| | Rocky habitats | 14 | 1 |
| | Sclerophyllous scrubs | 13 | 4 |
| species (other than birds) | Amphibians | 56 | 15 |
| | Arthropods | 130 | 23 |
| | Fish | 126 | 13 |
| | Mammals | 128 | 4 |
| | Molluscs | 41 | 23 |
| | Non-vascular plants | 53 | 6 |
| | Other invertebrates | 3 | 15 |
| | Reptiles | 84 | 12 |
| | Vascular plants | 594 | 5 |
| birds | Breeding birds | 335 | 1 |
| | Migratory birds | 231 | 4 |
| | Wintering birds | 151 | 1 |

*Table 1 Overview of impact of the pressure G01 (Sports, recreation and leisure activity) on Habitats, Species (other than birds), Breeding, Migratory and Wintering birds. In the second column the number of habitats or species within the ecosystem of species group is given. In the third column the rank of G01 among the 79 main pressures is given.*

**Discussion**

The results might seem surprising, as the overall impact of recreation on biodiversity is considered minor compared to other pressures (Young et al. 2005). The results are based on expert knowledge and should therefore be used with care (Sutherland and Burgman 2015). However, due to the large number of experts from different countries and the standardized method, the results provide a robust indication of the impacts (Martin et al. 2012). It might be that experts chose recreation, because it is one of the few human activities that is permitted in most nature areas. Still, as most of the habitats and species protected under the HBD generally occur more frequently within protected areas (Van der Sluis et al. 2016) we tentatively conclude that recreation is indeed a main pressure for Europe's most vulnerable species and habitat types.

To face this pressure, the EU needs to coordinate actions and exchange good examples for sustainable tourism. The databases can be used to find habitats and species where coordinated actions are needed. Good examples are the Egyptian vulture (Neophron percnopterus), wintering Dunlin (Calidris alpina), the Loggerhead (Caretta caretta) and Malcolmietalia dune grasslands. They occur in several countries, their conservation status is 'unfavourable' and recreation is considered an important pressure. However, currently there is no EU policy on tourism and recreation. A more systematic use of appropriate tools for planning of tourism and recreation activities in Natura 2000 site should be promoted, e.g. for impact assessment and monitoring, estimating carrying capacity, analysis of demand and opportunities, socio-economic benefits, etc. (The N2K Group 2019).

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# 115 Wildlife disturbance caused by nature sports: an overview from general to specific

**Léna Gruas[1]**, **Clémence Perrin-Malterre[1]**, **Anne Loison[2]**, [1]EDYTEM - Université Savoie Mont Blanc, France. [2]LECA - Université Savoie Mont Blanc, France

In the context of urban living and growing disconnection with nature, nature sports are seen as a way to escape everyday life, to provide new sensations, emotions and experience (Melo et al. 2020). Thus, like nature-based tourism, nature sports are becoming more and more popular worldwide and generate high numbers of visitors in nature. This leads to short, middle and long-term impacts on wildlife (Larson et al., 2016 ; Marchand et al., 2014).

Mitigating the impact of recreationists has become a major challenge for natural area managers who often express the need to be provided with information about the visitors. Indeed, as managers start to organize and take this emerging issue into consideration, land use restrictions and other awareness raising campaigns flourish in mountain territories. Knowledge of nature sports participants is thus required, not only to make them aware of the issue but also to know which factors influence awareness the most and to get feedback on the way measures are perceived and accepted by visitors. Yet, if much research in the field of ecology has been done to show the existing impacts of recreation on wildlife, little research was led on the perception and acknowledgment of the impacts by recreationists.

We offer to deal with the topic by presenting the result of a 3-year research on mountain sports and disturbance in the northern French Alps. We will start by presenting a short literature review of what has been done, then we will focus on the results of our large scale quantitative research of participants in four different types of mountain sports (n=2559) and finally focus on a qualitative discourse analysis of 31 ski tourers to understand the different reasons why they might not comply to measures such as tranquillity areas for wildlife.

**1 – Wildlife disturbance from a human perspective: a shortcoming to address.**

Reviewing the existing work on recreationists awareness of disturbance was a significant part of the work. We followed the systematic quantitative literature review method by Pickering and Byrne (2014). The published review (Gruas, Perrin-Malterre et Loison, 2020) revealed a dearth of research on the topic, especially compared to research in ecology : we reviewed 47 papers, most of which had a majority of unaware respondents, while Larson et al. (2016) reviewed 274 papers that showed widespread effects of recreation on animals. It also appeared that a large part of the papers (79%) focused on non-sporting activities while nature and mountain sports have been left out of the research. Finally, our review revealed impossible to consistently explain which factors influence the awareness level of respondents.

**2 – Which factors influence wildlife perception: an applied example from a large sample of recreationists.**

To evaluate awareness of mountain sports participants in the northern French Alps, we conducted our own questionnaire survey. Data was collected with ski tourers, snow-shoers, hikers and trail runners in four mountain ranges during two years, to reach a total of 2 559 valid surveys.

Multiple correspondence analysis was performed on a set of variables. The aim was to evaluate the global attitude of respondents towards wildlife in the context of their sporting activity: it included interest for animals, perception of disturbance, and acceptance of restrictions. Three profiles came out of the hierarchical clustering:

- The “mutualists” named after Fulton et al. (1996) wildlife orientation types. They showed great interest in mountain animals, were aware that they could be a source of disturbance and believed wildlife should be protected by all means (24%).
- The “moderates” who are happy to meet wildlife but do not seek contact with it. They are aware that they can be a disturbance and believe mountain wildlife should be protected as long as its protection does not encroach too much on their freedom to roam (43%).

- The “indifferents” are usually so used to seeing wildlife that they barely stop to watch it anymore, they are neutral towards the possibility of disturbance or sometimes even deny it. They often refuse all type of restriction to their activity (33%).

Several variables were tested to explain what influenced belonging to one profile or the other the most but few were significant. We found out for example that hikers and women were overrepresented in the “mutualist” profile, while ski tourers and men were overrepresented in the “indifferent” profile. All in all, the variable that turned out to explain global attitude towards wildlife the most ($p = 0,00$; $Khi2 = 215,68$; $ddl = 6$) was the level to which respondents adopted eco-attitudes and behaviours in their daily lives.

**3 – Tranquillity areas for wildlife: why is it so hard to comply? A qualitative discourse analysis.**

The survey showed that 43% of ski tourers always avoided tranquillity areas set up by managers. Through discourse analysis based on 31 semi-structured interviews, we investigated reasons why the other 57% of these recreationists allowed themselves to occasionally, or even often, penetrate the zones regardless of the impact it could have on wildlife. Their main arguments revolved around freedom, hunting, performance, pleasure and safety.

Our research allowed to dive into the emergent question of nature sports enthusiasts’ perception of wildlife disturbance. We showed that, although it has received little interest so far, it is a complex question that deserves to be deepened. Indeed, it appears that although a large number of respondents consider that their activity can have an impact on the natural environment and its inhabitants, few of them fully assume the responsibility and use various strategies to shift the blame. Although wildlife conservation measures are mostly accepted, more than half of the recreationists try to justify their - usually occasional - non-compliance with various reasons. These attitudes reflect a real interest in wildlife and its conservation, but an interest that is easily altered by the motivations of practice or by the need to preserve the image of oneself by minimizing the perception of one’s impact.

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# 54 Disturbance caused by recreational activities -Case study Regional Nature Parc Beverin (RNPB), Switzerland

**Martin Wyttenbach**, **Felix Volpert**, **Adrian Hochreutener**, **Reto Rupf**, Institute of Natural Resource Sciences, ZHAW - Zurich University of Applied Sciences, Switzerland

**Introduction**

Due to their structural diversity and altitude gradients, mountain regions provide suitable habitats for a diverse range of wildlife and plant species (Ingold, 2005). At the same time, they are important recreational areas for humans. Due to the increase in outdoor activities, negative impacts on nature and wildlife should be counteracted by means of focussed visitor management (Clivaz et al., 2013).

The RNPB is visited by tourists all year round, with a greater proportion in the summer season. The landscape consists mainly of forests, alpine areas, extensive meadows, pastures, habitats for pioneer species, and covers an area of 412 $km^2$. The RNPB aims to enable recreationists to experience nature without disturbing it at the same time. In order to achieve this goal, it is necessary to determine which types of recreational activities may be practised in the area and how they can be characterised (spatially, temporally, frequency). The aim of this study is to identify areas in summer and winter in which a potential conflict between recreationalists and nature could occur based on a spatial mapping approach.

**Methods**

To evaluate where recreational trails most affected sensitive wildlife, we used a geographic information system (GIS)-based approach. For this purpose, we 1) chose relevant recreational infrastructures; 2) determined where wildlife habitats are in proximity of trails; 3) identified the ecological sensitivity of the habitats affected and 4) calculated the loss of available habitat.

Recreational trails were represented by official hiking and mountain biking trails (summer), and snowshoe, backcountry skiing routes, winter hiking and sledging trails (winter). Depending on the movement pattern of recreationalist traffic, recreational trails were assigned linear or planar. The selection of relevant wildlife species was based on a literature review and discussions with experts. Target species were then grouped into species groups representative of different habitats (Graf et al., 2012). The sensitivity of habitat areas was based on the species composition and their sensitivity to disturbances caused by recreationists. If multiple species occurred, their sensitivity was cumulated. To identify trail sections affecting a habitat, the habitats were blended with the recreational trails. Habitat loss was calculated as the share of recreationally-affected habitat divided by the total habitat area. Finally, we assigned each trail section a potential ecological conflict class (no, low, medium, high and very high), according to the sensitivity and habitat loss.

The results were visualised as topographical maps (summer/winter), which show the recreational trails in graded shades of red, depending on their ecological conflict potential.

Figure 1: Schematic illustration of the potential for ecological conflict of the path infrastructures in a section of the RNPB in summer. The buffer around the recreational trails represents the area of the available habitat affected.

**Results**

The habitats most affected during summer are forests, alpine areas, extensive meadows and pastures. Conflict potential was assigned to 87 % of the trail sections. Low to medium conflict potential is to be expected in 72 % of the trail sections and high or very high conflict potential in 15 %. Furthermore, the analysis shows that in highly sensitive habitats, up to 46 % of available habitat can be affected by recreationists. In low and medium sensitive habitats, 34 % and 41 % respectively of the available habitat can be affected.

The habitats most affected during winter are forests and alpine areas. For 45 % of the recreational trail sections, potential conflict was assigned. Trail sections with low to medium conflict potential were assigned to 28 % of the path network. A total of 17 % of the path sections showed high or very high conflict potential. Furthermore, the analysis shows that in highly sensitive habitats up to 22 % of available

habitat can be affected by recreationists. In low and medium sensitive habitats, 33 % and 26 % respectively of the available habitat can be affected.

In summer, a larger proportion of the recreational trails indicates potential for conflicts than in winter. Increased conflict potential is mainly present in areas where multiple species occurred in the same habitat (Figure 1).

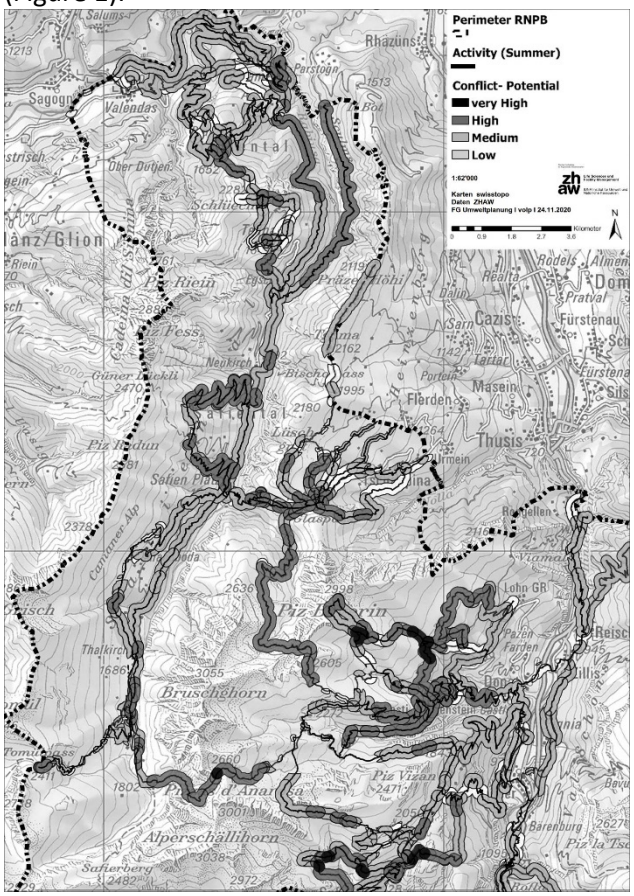


*Figure 1.*

**Conclusions**

The results of the study indicate that the ecological conflict potential between recreationalists and wildlife is higher in summer than in winter. This is primarily because the habitat areas are larger in summer. Therefore, the chances are higher that a trail crosses habitats. During winter, wildlife is often concentrated in small areas and, due to external conditions, it needs to conserve energy and is physically adapted to do so (Graf et al., 2012). Travelling in deep snow is energy intense. Therefore, we want to stress that in winter wildlife often reacts much more sensitively to disturbances than during summer. It should be noted that despite wildlife being concentrated in small areas, winter recreation activities are often carried out over a wide area, some of which may be inaccessible in summer, so wildlife is still at significant risk of being disturbed.

We calculated potential ecological conflicts based on wildlife habitats and recreational infrastructure features. However, the frequency of disturbance can have a decisive influence on wildlife reactions (Tablado & Jenni, 2015). In this context, visitor monitoring data is important to alleviate human-wildlife conflict.

By using a GIS-approach, we demonstrated how to locate areas with potential ecological conflict over a large region. This basis in combination with a participative process involving various stakeholders allows the establishment of a visitor management system including visitor guidance measures. In a next step, the inclusion of visitor count data may be included and the results verified in the field. The analysis may be employed in other protected areas to identify potential conflict zones between recreational infrastructure and wildlife.

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# 61 Media representation of nature, mass ecotourism, and the visitor experience

**Julius Arnegger[1,2], Marc Herz[3], J. Michael Campbell[4]**, [1]West Coast University of Applied Sciences, Germany. [2]DITF - German Institute for Tourism Research, Germany. [3]Kleinundpläcking GmbH, Germany. [4]University of Manitoba, Canada

The soft or mass ecotourism sub-field makes up a large percentage of the ecotourism sector in many regions worldwide. This sub sector is generally characterized by larger group size, lower environmental commitment, and higher levels of service standards when compared to traditional "hard" ecotourists (Weaver, 2001).

It has been argued that this popularity is driven in large part by representations of nature in popular media such as documentaries and magazines (Lemelin, 2006). Generally, any form of media may play a salient role in tourism contexts, i.e. raising expectations toward destinations, trips or tourism experiences, which may not be met in reality (Michalkó et al., 2015). Thus, while media has the potential to positively impact people's expectations, perspectives and attitudes it also implies the danger of overpromising. Individuals with unrealistic expectations are hence more likely to experience some form of disappointment (Bramwell, 1998).

These general notions can be expected to be specifically relevant in nature-based settings, in that tourists' expectations may be highly influenced by curated representations of nature and wildlife. In turn, expectations are generally assumed to impact satisfaction which is a main driver for positive behavioral outcomes such as intention to re-visit and positive word-of-mouth (Faerber et al., 2021). When applied to wildlife tourism experiences we assume that the more the held image (shaped by media consumption) differs from objective reality, the greater will be both the tourists' expectation and his/her disappointment.

The present study examines the relationship between visitors' pre-trip expectations and post-trip satisfaction of a mass ecotourism nature experience as a function of previous involvement in nature activities and organizations, and consumption of wildlife and nature-based media. To test our conceptual model (Figure 1) and hypotheses using structural equation model, we conducted a survey with actual visitors (N = 526) on harbor seal (Phoca vitulina) watching boat tours in the Schleswig-Holstein Wadden Sea National Park in Northern Germany. These tours fit the main characteristics of mass ecotourism, i.e. a standardized product marketed to a large number of customers, with a low focus on environmental learning and physical activity.

The survey procedure was divided into two stages using a self-administered questionnaire. In the first stage (pre-tour), visitors were asked to provide their degree of eco-media usage, their personal eco-involvement (the degree to which nature/wildlife play a role in their lives) and their pre-tour expectations. In the second stage (post-tour) visitors rated their post-tour experience and behavioral intentions after the tour.

The following hypotheses were postulated:

H1: Mass ecotourism experiences lead to disappointment among participants.

H2a: Higher degree of eco-media usage leads to higher expectations of ecotourism trips.

H2b: Higher degree of eco-media usage leads to lower experience ratings of the actual ecotourism trip.

H3a: Higher degree of personal eco-involvement leads to higher expectations of ecotourism trips.

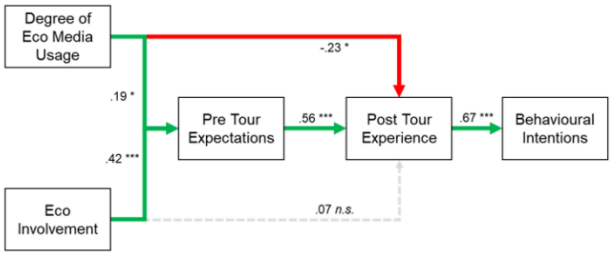
H3b: Higher degree of personal eco-involvement leads to lower experience ratings of the actual ecotourism trip.

H4: Visitors' pre-trip expectations determine their post-trip experience.

H5: Better ecotourism trip experience leads to more positive behavioral intentions toward future ecotourism trips.

To analyze visitors' satisfaction, we compared pre-tour expectations with post-tour experience on an intraindividual level. We assessed expected level of emotions, learning and experience (pre-tour) with their actual perceived level of emotions, learning and experience after the trip (post-tour). All measures significantly decreased after the tour, confirming H1. With regard to learning, the difference between pre-tour expectations (M = 3.61, SD

= .90) and post-tour evaluation of the experience (M = 2.76, SD = .87) was highest among the three measures (t(525) = 9.64, p < .001).




Note: Completely standardized coefficients shown | *** p < .001; ** p < .01; * p < .05; *n.s.* = not significant
Fit indices: $\chi 2$ = 370.30; d.f. = 70; RMSEA = .092; SRMR = .087; NNFI = .912; CFI = .932; GFI = .906; AGFI = .859

*Figure 1: conceptual model*

Results further show that eco-media usage significantly increases visitors' pre-tour expectations (β = .19; p < .001), confirming H2a (cf. Figure 1). Thus, a larger degree of eco-related media usage leads to significantly higher expectations toward nature/wildlife tourism experiences. However, eco-media usage has the contrary effect on the post-trip evaluation: here, we find that eco-media usage has a significant negative effect (β = -.23; p < .001), confirming H2b. It shows that consuming a higher degree of eco-related media content leads to a lower mass ecotourism trip experience. When looking at the effects of eco-involvement, we find that in parallel to eco-media usage a higher degree of personal eco-involvement again leads to higher pre-tour expectations (β = .42; p < .001), confirming H3a. In contrast, personal eco-involvement did not have a significant effect on visitors' post-tour experience (β = .07; n.s.), rejecting H3b. It, thus, appears that visitors' personal involvement in nature and animals leads to higher expectations before the mass ecotourism trip. Yet, in contrast to eco-media usage this involvement appears to mitigate the potential disappointment of the mass ecotourism trip experience, as visitors with a higher personal involvement may be able to more accurately evaluate the experience and put it in perspective.

Confirming hypothesis H4 we find that visitors' pre-trip expectations significantly determine their post-trip experience (β = .56; p < .001). Finally, we find that higher post-trip experience significantly increases visitors' behavioral intentions (β = .67; p < .001), confirming H5. Visitors who rate their experience of the mass ecotourism trip better have a higher intention to repeat the tour, go on more nature or wildlife tours or recommend the tour to others.

In line with common ecotourism definitions the study confirms that tourists regard environmental learning as a key component of ecotourism experiences, including in mass ecotourism settings; a low focus on environmental learning thus leads to significant disappointment.

The results further confirm that nature media consumption can lead to unrealistic expectations and disappointment. Both in terms of marketing measures and development of nature-based tourism offers, tour operators should take these findings into account in order to adequately manage experiences.

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## 177 Staging the wild: Photographers' behaviour and attitudes towards the use of bait, hides and landscape modifications in large carnivore photography

**Vilde Johnsgård Nygaard**, Norwegian University of Life Sciences (NMBU), Ås, Norway

Wildlife photography is a growing phenomenon in Scandinavia. As most forms of wildlife tourism, wildlife photography may have positive and negative effects, on both local communities and wildlife itself. Therefore, it is interesting to investigate tourists´ ethics in relation to wildlife photography. My work explores photographers' perceptions on the phenomena "wildlife/wild animals" and "wilderness". These perceptions are also linked to the photographers' values. Furthermore, I investigate how they reflect upon facilitating or manipulating both the wildlife itself and the wilderness that serves as a backdrop, in wildlife photography. To investigate these issues, the main research questions applied were:

- What do the photographers think about (baiting) to make wild animals viewable?
- What do the photographers think about physical manipulation in the field?
- What do they think is "bad practice" in facilitation?

Data were collected through semi-structured interviews, allowing participants to elaborate on topics they were more knowledgeable about. To facilitate in-depth conversations about the topic, semiprofessional photographers were interviewed. To get a broader sample of photographers, a few serious amateurs were also included. For example, some of the informants used to be photographers, but now work mostly as guides and facilitators of photography tours, and do not take as many photographs themselves anymore.

The informants mentioned that they often work with their own projects or that they work with costumers such as magazines, newspapers and book publishers, that need certain types of pictures. The photographers also take pictures that can hang on the wall and they strive for taking pictures that no one has ever seen before. The photographers plan their projects carefully. They draw, dream about and plan their pictures a long time before they go out in the field. They know exactly what pictures they want and need to take. The informants mentioned some criteria for what makes a "good picture". They focused on photo-technical expressions like the golden ratio, perspective, angle and focus. Seasons also have an effect on the type of pictures the photographers get. The informants are well aware how seasons affects how animals behave (mating, cubs and feeding), how they look (summer or winter coat), and what surroundings the photographers get (snow, blizzard, cottongrass, rays of sun/ stray light). In Norway, some wild animals are difficult to capture on camera, among other things because there are strict regulations on baiting. Therefore, going to Finland with a guide is often the best opportunity to photograph the Scandinavian species. According to the informants, the most common bait used in Finland is pig, pellets, fish and honey. They place the bait strategically near, or on, locations (on a tree stump, by a waterhole, in-between the cotton grass) where they want the animal to come or pass by. Some of the informants said they were more or less free to place bait at whichever location they would like to use. This seems otherwise to be regulated.

The informants also mentioned so-called "disturbing elements" that were removed to improve the quality of their photos. To handle smaller disturbing elements right in front of the camera, the informants clean the foreground (e.g remove small branches, hair strands, leaves, cones). When the background for example includes power poles or is just not what the photographer wants, they move the camera away from the disturbing element. When the guides use snow mobiles to place big pigs in the marsh, the ground is being torn up. Most pictures are taken where the marsh is less deteriorated. Additionally, when the photographers talk about photographing smaller animals, they often mention that they manipulate the area with branches and trees that they can move to get a suitable background. Though, some say that doing such manipulation as putting up branches and trees is only acceptable when photographing little birds in the garden. Props

helps to enhance the feeling of a pristine environment. Paradoxically, the motives that seems to be pristine or natural, are in fact staged in some way to enhance the pristine.

The informants were aware of how the production of certain types of images create an experience that nature is in balance, in a non-hostile environment. They are torn between pleasing their audience and being first-line links to tell what is happening in nature.

Even though the informants tried to tread carefully and capture the animals on their premises, some photographers tried to challenge both themselves and the animals' boundaries in getting the best picture. I believe that the feelings of control, knowledge and competition affects the judgement that are made in the specific on-site situation. In worst case scenarios, bad judgement can lead to severe impacts for animals.

This means that many different assessments of these guidelines are exercised, and the only way to get a change is if they are exposed or confronted with it. Some of the informants said they tried to report if they saw ethical abuse being committed. Such whistleblowers are important contributors to develop better ethical judgement amongst the photographers.

The informants felt that the bait did not influence the feeling of the animal's natural behavior, hence the animal approached it by free will. The majority of the informants did not feel any ethical issues with using bait on wildlife. They highlighted 4 reasons for this; animals have a diverse nutrition, baiting has been legal for a long time in Scandinavia until recently (2020 in Norway), socially acceptable method in wildlife related activities and the spatial context of wildlife encounters.

Paradoxically, several of the informants expressed cognitive dissonance by wanting to meet and photograph the animals at a random meeting, and not on bait. There is thus no unanimous agreement that bait is either good or bad practice. It is important to challenge the traditional values if human wildlife interactions are to develop in a sustainable direction that benefits animal welfare.

It is important that stakeholders are aware of the mentioned social, ecological and animal welfare consequences as popularity of wildlife photography increases. The practice of wildlife photography should involve the public in the process of making wildlife photography.

## 183 Between a rock and a hard place: How nature guides in Arctic Svalbard navigate conflicting norms

**Torill Brandal Berge**, Norwegian University of Life Sciences (NMBU), Ås, Norway

Wildlife tourism is a powerful tool to create transformative experiences, which may lead to improved environmental behaviors and promote conservation efforts (Ballantyne et al., 2011). Increased capacity and affordable prices allow a growing number of people to participate in wildlife tourism in remote and vulnerable destinations. Although tourism can benefit the human and economic dimensions, the industry generally affects the environment, ecosystems, biodiversity, and animal welfare negatively (Winter, 2020). Despite this, conservation has traditionally been an important justification of wildlife tourism. However, a common understanding of the sustainability concept is to ensure development that preserves natural resources for future generations. This perception continues the anthropocentric world view and does not recognize nature and non-human species' intrinsic value.

Human-wildlife interactions in the context of tourism have received significant attention in the academic literature. However, non-consumptive wildlife watching tourism taking place in animals' natural habitats has received less attention than hunting and fishing tourism and human interactions with captive wildlife. Meanwhile, increasing global pressure to visit remote places with unique fauna requires an improved focus on wildlife viewing tourism in animals' natural habitat. Tourism's interest in exotic and endangered species is growing and poses a considerable challenge, particularly evident in the Arctic. Polar bear tourism exemplifies the paradox where a vulnerable species is synonymous with both attractive tourism experiences as well as being a symbol of climate change (Lemelin & Dyck, 2008). Also, the demand for close interactions with wildlife has been stimulated and reinforced by marketing and behavioral trends, which poses new challenges to the niche. Therefore, wildlife destinations must strive for comprehensive and interdisciplinary management strategies taking into account both conservation and animal welfare concerns (Winter, 2020).

This study explores nature guides' norms, attitudes and behaviors related to polar bear interactions in the context of wildlife watching tourism in Arctic Svalbard. Svalbard is one of five international destinations for polar bear tourism despite current management policies and regulations that do not encourage active polar bear tourism. The archipelago largely consists of protected areas and the region is subject to strict environmental regulations. A formal provision that specifically challenges polar bear experiences is the prohibition against actively seeking for polar bears: "It is prohibited to lure, pursue or otherwise seek out polar bears in such a way as to disturb them or expose either bears or humans to danger" (Svalbard Environmental Protection Act, 2001, Section 30). The rule is considered to both protect bears and avoid that they pose a danger to humans, and thereby also to the animals themselves.

The main objective of this study is to understand how norms regulate nature guides' behaviors during polar bear interactions. We also investigate what influences these norms and how awareness and knowledge of norms may improve behaviors among actors in the Arctic wildlife tourism industry. Data was gathered through 10 semi-structured interviews with nature guides, corporate interest groups and the local government in Svalbard. Findings suggest that moral standards, guidelines, and legislation protecting wildlife are challenged when meeting conflicting goals and interests. Furthermore, improved human-wildlife interactions can be achieved through addressing negative behaviors towards ecosystems, biodiversity, and animal welfare, in combination with structural fixes such as wildlife tourism standards and formal norms.

Informal norms may be influenced and can contribute to mitigating negative behaviors by the tourism industry, by establishing personal and socially acceptable standards for conduct. Results indicate that strong injunctive norms related to polar bears and loyalty towards the official legislation, support nature guides from giving in to possible pressure from tourists' expectations and employers. Meanwhile, tourists seem highly capable of adjusting their expectations, while guides have high expectations

towards each other. Their strong sense of responsibility towards wildlife is motivated by education and common standards as well as direct experience with guiding in Arctic Svalbard. However, guides can be stuck between rocks when dealing with a variety of sanctions and other people's subjective interpretation of observed polar bear events. For example, personal, social, and formal sanctions may be drivers for behavior. Personal sanctions may be bad conscience due to an unfortunate situation getting too close and stressing a polar bear. Social sanctions often occur through negative attention in social media or losing reputation and job opportunities by being accused of misconduct. Formal sanctions may be a penalty in the form of fines or imprisonment not exceeding one year. Thus, land-based winter activities seem easier to monitor and regulate than summer voyages. A better understanding of nature guides' norms and behaviors as well as including ethical aspects to planning and management, hold potential to benefit endangered species roaming in vulnerable habitats.

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# 31 Cold as Ice? Arctic tourists' epiphanies and connection to wildlife

**Jennie Warmouth**[1], **Jeffrey Skibins**[2], **Gwyneth Schuler**[2], [1]National Geographic Grosvenor Teacher Fellow, USA. [2]East Carolina University, USA

## Introduction

Wildlife tourism is expected to produce conservation benefits for species observed during a trip. This is due, in part, to the unique wildlife encounters that occur during such trips. It is hypothesized that the more unique and rare animal encounters in the wild are, the more likely tourists will be to realize heightened emotional states.

Previous studies have explored tourists' emotional connection to wildlife (i.e., conservation caring) and environmental epiphanies as two constructs to evaluate the effect of wildlife tourism experiences. Furthermore, these constructs are shown to have a direct positive influence on conservation behaviors. This study investigated tourists' conservation caring and environmental epiphany levels during a 10-day wildlife viewing cruise through the Svalbard Islands (Norway).

The purpose of this study is to explore 1) if arctic tourism is capable of stimulating an environmental epiphany; 2) the emotional connections (i.e., conservation caring) arctic tourists form with wildlife, and 3) the relationship between environmental epiphanies and conservation caring.

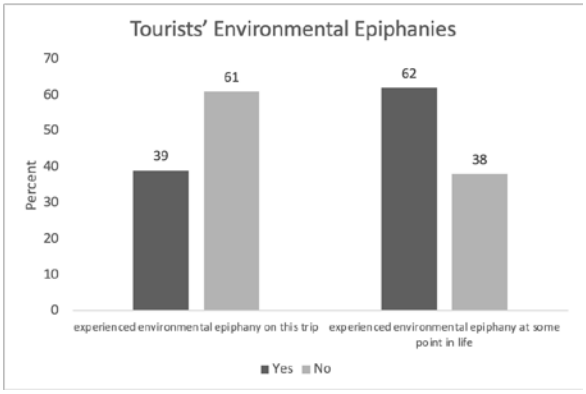
## Methods

This study was conducted aboard Lindblad Expedition's National Geographic Explorer during a ten-day arctic cruise in June 2019. The expedition, entitled Land of Ice Bears: An In-Depth Exploration of Arctic Svalbard, was offered in joint partnership between Lindblad Expeditions and the National Geographic Society. The partnership's educationally oriented marine expedition voyages encourage guests to interact with and learn from scientists, naturalists, and researchers while exploring remote natural environments. The June 2019 expedition involved a total of 142 guests, 14 field staff, and two Grosvenor Teacher Fellows. Data were obtained from 72 tourists onboard during the return voyage.

## Results

Participants were asked to identify the animal to which they formed the strongest connection during the expedition. Walruses were the most commonly reported animal to which tourists reported a connection at 52%, polar bears were the second most common at 33%, all other species were each less than 5% (arctic fox 1.6%, bird 3.2%, lichen 1.6%, reindeer 3.2%, whale 4.8%). Tourists reported developing strong emotional connections to polar bears and walruses. There was no difference in conservation caring scores between species.

Environmental epiphanies were realized by 39% of tourists during this trip. Additionally, 62% of tourists reported having had an environmental epiphany at some point in their life. Tourists who experienced an environmental epiphany on this trip had significantly higher ($t(56) = -3.16$, $p = .003$; eta = .34) conservation caring scores (6.77 + 1.31) than those who did not experience an environmental epiphany (5.46 + 1.63). Tourists who had previously experienced an environmental epiphany also had significantly higher ($t(55) = -2.88$, $p = .006$; eta = .36) conservation caring scores (6.34 + 1.23) compared to those who had never experienced an environmental epiphany (5.17 + 1.83).




## Discussion

Previous studies have shown conservation caring to be a strong predictor of pro-conservation behaviors, which are often a desired tourist-based outcome of ecotourism. Thus, higher levels of conservation

caring would increase the likelihood of tourists performing pro-conservation behaviors. This study has found that arctic tourists who experienced environmental epiphanies formed stronger emotional connections with observed wildlife, regardless of species, and had higher conservation caring levels than tourists who did not experience an environmental epiphany. As conservation caring is a predictor of pro-conservation behaviors, it would imply that these tourists would be more likely to engage in desired pro-conservation behaviors.

Overall, this study has provided empirical support for the ability of ecotourism to effectively cultivate the conservation psychology constructs of environmental epiphanies and conservation caring. Both constructs have been shown to predict pro-conservation behaviors. This supports the claim that ecotourism is capable of providing experiences that fundamentally connect people to nature. Such connections are known to be strong positive predictors of pro-conservation behaviors. Furthermore, these outcomes function independent of the congruence between tourists' expectations and experiences. This could help to alleviate pressure on operators to provide specific wildlife encounters and/or violate management policies surrounding human-wildlife encounters.

## 149 Towards a model for the assessment of conservation, welfare, and governance in wildlife tourism attractions

**David Fennell**[1], **Tom Moorhouse**[2], [1]Brock University, Canada. [2]University of Oxford, United Kingdom

In the absence of appropriate standards to regulate wildlife tourism attractions (WTAs), the treatment of animals is morally justifiable on the basis of what tourists find acceptable. Under this model, there is little motivation for operators to improve standards if tourists do not leave reputationally damaging feedback. Given this current state, the objectives of this paper are twofold. First, we wish to highlight and categorise existing systemic barriers that prevent the operation of a green market for WTAs. Second, we combine knowledge of these barriers with a recently published theoretical framework on animal justice to derive an initial, robust set of practical criteria with which non-expert tourists can externally assess - and accurately represent to other tourists – ethical standards at WTAs. These criteria allow tourists to better understand the scope and consequences of the proper and improper use of animals in tourism, which, in turn, will hopefully induce positive change along governance, conservation and animal welfare lines.

# 121 The recreation ecosystem: A social-ecological systems application for recreation ecology highlighting wildlife

**Anna Miller[1]**, **Dale Blahna[2]**, **Yu-Fai Leung[3]**, **Wayde Morse[4]**, **Mary Rowland[2]**, [1]Utah State University, USA. [2]USDA Forest Service, USA. [3]North Carolina State University, USA. [4]Auburn University, USA

**Introduction**

Ecology is a complex discipline, involving interactions between organisms and between organisms and their environment. It is inherently interdisciplinary, with "organisms" referring to all life science disciplines, "environments" encompassing all natural sciences, and "interactions" implying systems analysis of natural with social, political, and economic sciences. Despite a history of conflicting philosophical and methodological approaches, Keller and Golley (2000) argue that ecology has come to embrace the idea that human-dominated communities are 'natural systems' and that ecology is a 'science of synthesis' in its interpretation of nature.

Recreation ecology is a subdiscipline that traditionally focused on advancing the understanding of negative impacts of recreational activity on ecosystems, likely resulting from the early focus of this field on one-way relationship (e.g., Cole 1987, Liddle 1997). Examples of topics illuminated through recreation ecology research include the impacts of recreation on soil erosion, water quality, vegetation, invasive species, wildfire, and wildlife. A limited subset of recreation ecology research has framed research questions as stemming from a two-way relationship, and many authors articulate their work as contributing toward the dual goals of balancing biodiversity conservation and recreation opportunities. An alternative conceptualization of recreation ecology has been proposed to broaden the field by investigating two-way relationships between outdoor recreationists and the ecosystems in which they recreate (e.g., Leung & Marion 1996, Ryan 2015).

Research outside the recreation ecology field investigates the benefits of natural ecosystems on recreationists, benefits of recreation on the protected ecosystems in which it occurs, and negative impacts of ecosystem components on recreation. Other, less common explorations apply ecological concepts to understand recreation opportunities, activities, and behavior. However, empirical research investigating relationships between social and ecological systems in the recreation context within the same research project (e.g. D'Antonio et al. 2013) are sparse. A recent review of the recreation ecology literature revealed this scarcity, with only 3.4% of articles considered interdisciplinary (Sumanapala & Wolf 2019). Interdisciplinary research is critical in understanding how social and ecological systems work together in the outdoor recreation context. This gap could be addressed through development of a framework for interdisciplinary studies in recreation ecology.

Our aim is to provide a simple framework for situating recreation ecology research in the larger social-ecological system, broadening the field to incorporate two-way interactions between recreation and ecosystems. These interactions range from positive to negative, with feedbacks occurring at nested hierarchical levels (Figure 1). We argue that this framework is more representative of this highly complex system than traditional human-impacts research and provides a more holistic understanding of the recreation ecosystem. We illustrate this framework with a wildlife case study.

**The Framework: Application to Wildlife-Recreation Interactions**

Through its inherent connection with all ecosystem components, wildlife provides an excellent nexus to illustrate the social-ecological system framework for recreation ecology. Below we provide a snapshot of research topics within each of the four quadrants in our proposed framework (Figure 1), first describing the quadrant traditionally addressed in recreation ecology research.

**Quadrant 3: Negative effects of people on wildlife**

The traditional definition of recreation ecology as human-impacts research falls entirely within this quadrant. Recreation has many direct negative effects on

wildlife, ranging from stress to fatality. Indirect effects include altering habitat features, such as soil compaction or vegetative structure.

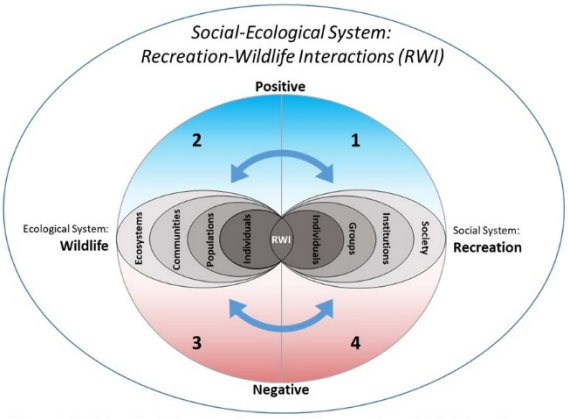



**Figure 1.** Social-ecological systems framework for recreation-wildlife interactions. (Reproduced with permission from Miller et al. 2020).

**Quadrant 4: Negative effects of wildlife on people**

Research within this quadrant is often referred to as human-wildlife conflict. Such conflicts can threaten human safety, e.g., animals attacking hikers, or result in property damage such as bears destroying cars or tents. These conflicts affect both the recreationists' experience and sometimes the fate of the animal involved. If conflicts occur repeatedly, they can scale up to affect people and wildlife at systemic levels.

**Quadrant 1: Positive effects of wildlife on people**

A large and growing body of literature investigates the positive outcomes of wildlife and habitat contacts for people, often quantified as ecosystem services. Wildlife-based recreation is an important draw for protected area tourism and can have large economic benefits. Natural landscapes that host native wildlife populations deliver health and well-being benefits to those that recreate in them. Incorporating the benefits of wildlife for recreationists into recreation ecology research is critical in developing knowledge of these two-way relationships. Likewise, integrating human-benefit research into protected area management can help ensure that recreationists maximize benefits from their experience while maintaining critical habitat for wildlife, thus realizing the dual goals of protected area management.

**Quadrant 2: Positive effects of people on wildlife**

Outdoor recreationists and others can be powerful supporters of public land and wildlife conservation goals, in donating time and money toward environmental protection, or behaving in more environmentally-friendly ways. Positive associations between conservation behaviors and participation in outdoor recreation, specifically wildlife-dependent activities, have been found in multiple settings. Benefits of wildlife-based recreation for wildlife have been institutionalized, e.g., through revenue generated by hunting and fishing licenses. Weighing these considerable benefits with the negative impacts of recreation on wildlife is critical in decision-making.

**Implications**

The concepts advanced above are more than a semantic debate. From a policy perspective, most protected area designations entail public use, community economic benefit, cultural resource protection, and other requirements that suggest positive interactions between humans and natural systems are important subjects for recreation ecology. While humans have an outsized impact on the environment, they also can bring outsized benefits. Research on these and other topics are usually not the focus, or well-synthesized, in recreation ecology.

The discipline of recreation ecology is at a turning point, concomitant with other fields demonstrating progress by integrating formerly siloed research into a social-ecological system. Through the proposed social-ecological system framework of recreation ecology presented here, we aim to coordinate this effort. Ultimately, we posit that these changes in the recreation ecology paradigm can advance the outdoor recreation field beyond perceived problems and improve outdoor recreation management for future generations.

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# 134 Why are some species more popular with wildlife tourists: Insights from South Africa.

**Joy Mangachena**, **Catherine Pickering**, Griffith University, Australia

**Introduction**

Wildlife tourism is popular in many countries and often takes place in protected areas including in developing countries (Higginbottom and Tribe, 2004). Income generated from this type of tourism can contribute to the economy and provide employment in rural areas, including in South Africa (Naidoo et al. 2011). Considering its potential benefits, it is important for those providing wildlife tourism opportunities to know which species are attractive to tourists and why. A common way to obtain this information is by surveying visitors in parks, and this has been done in a range of parks in South Africa, but how do the studies compare, and what species were most popular overall and why?

To assess tourists' preferences for wildlife tourism in South Africa, we examined data from multiple published surveys in several parks and private game reserves to: 1) examine consistency in species popularity among locations and visitors, and 2) identify species traits that may account for differences in popularity.

**Methods**

To determine the relative popularity of wildlife, we conducted a systematic search for academic papers containing visitor survey data from South Africa about tourists' species preferences using the guidelines for Preferred Reporting Items for Systematic Review Recommendations (PRISMA) (Moher et al., 2009). This involved searching for publications on Scopus, Google Scholar and Web of Science using the terms 'wildlife AND preferences AND tourists AND "South Africa"' in the topic, abstract or keywords up to September 2020. Eleven papers from the searches were downloaded and six of them representing seven surveys retained after removing duplicates and irrelevant studies. They often had different methods including who was surveyed and what they were asked, but all provide information about visitor species preferences. To determine which traits may contribute to species popularity, we collected data about 13 biological traits known to influence people's reactions to wildlife.

To assess consistence among the surveys, Spearman's rank correlation coefficients were used. We then assessed overall popularity of species using weighted averages among surveys. To identify traits for species associated with species popularity, we used ordination in non-metric dimensional scaling (nMDS) and conducted Generalized Linear Models.

**Results**

The surveys covered seven parks in South Africa (Table 1) with a total of 2,224 people surveyed. Although options were not limited to mammals, only mammals were listed by those surveyed. Across the 11 species listed in four or more surveys, the most consistently popular were elephant (48% of the 2,224 people, in all surveys), black and white rhinos (36%, 7 surveys), lion (36%, 7 surveys), cheetah (35%, 5 surveys) and giraffe (34%, 7 surveys). Species that were moderately popular were leopard (28%, 6 surveys), wild dog (26%, 4 surveys) and buffalo (26%, 6 surveys) while, zebra (16%, 6 surveys), kudu (15%, 5 surveys) and impala (12%, 6 surveys) were less popular. In preliminary results of ordinations and modelling, it appears that tourists' preferences for wildlife were mainly based on measures of visibility (size, colouration and behaviour) and cuteness (fluffiness), but further analysis of the data and additional measures of popularity other than surveys are still to be assessed.

**Discussion**

The combined results of park visitor surveys show that people want to see a relatively small subset of animals, and mammals, with just 11 out the 299 species of mammals in South Africa commonly listed as the desirable wildlife by tourists. This included large mammals with distinctive markings and coloration, species often found in open habitat, some that were fluffy, many that are easy to see including elephant, rhinos, giraffe, lion, leopard and cheetah. The ppopularity of these species could be a function of

familiarity and those involved in wildlife tourism and conservation may want to further diversify the species used to promote wildlife tourism and conservation, including less attractive or renowned taxa that are ecologically important to create awareness and clear misconceptions about them. Campaigns such as the little five (elephant shrew, ant lion, rhinoceros beetle, buffalo weaver and leopard tortoise) have been used among others to get people to engage with other wildlife, and the popularity of programs such as Meerkat Manner and others can foster interest in broader range of species. Expanding the range of species attracting and attractive to tourists can have benefit in terms of providing more wildlife viewing opportunities, but also promoting conservation of less iconic species and parks.

| Publication details | Location(s) of surveys | Visitors surveyed |
|---|---|---|
| Lindsey, P.A., Alexander, R., Mills, M.G.L., Romañach, S. and Woodroffe, R., 2007. Wildlife viewing preferences of visitors to protected areas in South Africa: implications for the role of ecotourism in conservation. Journal of Ecotourism, 6(1)19-33. | Pilanesberg and Kruger National Parks, Djuma and Ngala private reserves | 627 |
| Di Minin, E., Fraser, I., Slotow, R. and MacMillan, D.C. (2013). Understanding heterogeneous preference of tourists for big game species: implications for conservation and management. Animal Conservation, 16(3)249-258. | Hluhluwe-Umfolozi Park and iSimangaliso Wetland Parks | 429 |
| Maciejewski, K. and Kerley, G.I. (2014). Understanding tourists' preference for mammal species in private protected areas: is there a case for extralimital species for ecotourism? PLoS One, 9(2)e88192. | Shamwari private Reserve | 90 |
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| Hausmann, A., Toivonen, T., Slotow, R., Tenkanen, H., Moilanen, A., Heikinheimo, V. and Di Minin, E. (2018). Social media data can be used to understand tourists' preferences for nature-based experiences in protected areas. Conservation Letters, 11(1)e12343. | Kruger NP | 563 |

*Table 1. Details of the papers and surveys used to assess species popularity for wildlife tourism in South Africa (see enclosure)*

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# 91 Interpretation in Ásbyrgi: communicating with National Park visitors in Iceland

**Georgette Leah Burns[1]**, **Laufey Haraldsdóttir[2]**, [1]Griffith University, Australia. [2]Hólar University, Iceland

The tourism industry in Iceland is of significant economic importance to the country and, until global travel restrictions in 2020, the number of visitors to natural areas was continuing to grow. Corresponding with this increase is the need to effectively manage tourists to ensure safe and responsible experiences that are as socially, economically and environmentally sustainable as possible. This management includes decisions about interpretation – what information to provide for tourists and the most effective way to deliver that information to them.

This presentation will report on part of a project conducted at Ásbyrgi, in the northern section of Iceland's Vatnajökull National Park. The park's managers are cognisant that "Tourism in national parks is essentially about providing memorable nature-based experiences for visitors" (Weiler et al., 2019) and want to provide those experiences without disturbing the plant and animal life in the park. To achieve this, they are keen to implement interpretation that "aims to stimulate interest, promote learning, guide visitors in appropriate behaviour for sustainable tourism and encourage enjoyment and satisfaction" (Moscardo et al. 2004).

Visitors to Ásbyrgi most commonly arrive by private car or by bus on an organised tour. Entry is free and although there is a visitor centre on the main road many do not stop at it. Camp sites are available at Ásbyrgi and the area contains many marked hiking trails that range in length from a few minutes of walking to several hours. The most popular of these is a short, forested, trail to a pond (Botnstjörn) with a viewing platform and abundant birdlife.

A mixed method approach was used to collect both qualitative and quantitative data in two stages during August 2018. Visitor behaviour was observed at three sites in the park during both stages. The sites included the visitor centre, the main trail entrance, and the pond. Interpretive signage about the natural and cultural features of the area exists in all these locations. During the second stage, 120 visitors were interviewed about their experience in the park as they exited the trail and returned to the car park. In addition, park managers, rangers and tour guides (n=11) were interviewed about their opinions on the most effective ways to communicate with park visitors. Combined, the results reveal who visits Ásbyrgi and what activities they engage in whilst there, as well as the perspectives of a range of stakeholders on current and potential future interpretation strategies.

Observations of visitors at the three sites (n=92) revealed that the time spent viewing signs could depend on many factors, but the three most important were the presence of other visitors, the weather conditions and the time the visitor had available. If there was a perception of crowding at a sign, and people had to wait to view it, they were more likely to continue their walk without looking at the sign. If the weather was uncomfortable to stand around in, rain at that time of year in that location is common, then they were likely to spend less time reading the signs, even if there were no other people present. Visitors who arrived by private car and/or were camping nearby, usually had more time to spend at Ásbyrgi than those who were on a tour bus; thus, they were likely to devote more time to reading the signs.

Of the 120 visitors interviewed, approximately one quarter were from either Austria or Germany, just over half were from other countries in Europe. There were no visitors from Asia in this sample. This is reflective of the national statistics on visitor numbers, with Iceland receiving more visitors from Europe than anywhere else.

The most popular reason people gave for visiting the park was, as expected, due to the unique natural features of the area – particularly the geology. Some stated that they were there because they were following an itinerary suggested by a travel agent, or because they were on a bus tour and it was part of that itinerary. Many had learnt about the location from a guide book and/or online source. Wanting to visit somewhere that was a little 'off the beaten track', a location less known than many of the more commonly visited sites in Iceland, was also a popular reason for being in Ásbyrgi.

Responses about what the visitors wanted from interpretation in the park was mixed. Although most were satisfied with the amount of signage and the content of the signs, some said they wanted more and a few said they would be happy with less. Inquiring about preferred other ways to receive information about the park, we prompted visitors to think about electronic methods of communication, such as a downloadable app. While some were receptive to the idea, most were not. Using precious data was a key reason not to favour interpretation available on a hand-held electronic device, but the perception of wanting to appreciate the nature without interference of technology was a further key factor for many.

Overall, most visitors were satisfied with the existing interpretation at Ásbyrgi. However, as tourism pressure increases in the area a small number of signs that are difficult to read under adverse weather and crowding conditions might not be the best way to proceed. Managers and guides expressed concern that people do not always behave in appropriate ways in the park: signs requesting visitors to not use drones and to stay on designated paths, for example, were being ignored. As visitors spend more time at the pond than at the signs at the trail entrance, and were highly appreciative of information communicated verbally by guides, these could be options to explore for enhanced communication about both park features and desired visitor behaviour.

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# 20 Snorkeller attitudes and behaviours at two popular sites in Ningaloo Reef Marine Park, northern Western Australia.

**Danielle Godwin**, **Michael Hughes**, **Halina Kobryn**, Murdoch University, Australia

**Background**

Globally, coral reefs play various important roles. Despite only occupying ~0.2% of the surface of the ocean, coral reefs are home to diverse species, provide ecosystem services and generate income for millions of people (Cesar et al., 2003). Approximately 18% of all coral reef habitats are in marine protected areas. While marine protected area management commonly seeks to balance conservation and human use, there are ongoing concerns about human activity impacts, including recreational uses like snorkelling. The World Heritage-listed Ningaloo Reef Marine Park, in northern Western Australia, receives approximately 179,000 visitors annually, with snorkelling rated as the most important and popular recreational activity in the Marine Park (Jones et al., 2011).

Although snorkelling is generally considered a low-impact activity, growing evidence suggests that certain behaviours, including fin kicks, brushes, grabs, and sitting, standing or kneeling on corals, may damage coral colonies, which are slow to recover (Webler & Jakubowski, 2016). While previous studies looked at 'how' snorkellers impact Ningaloo Reef, few have looked at behavioural drivers to understand 'why'.

**Project aim**

This study sought to identify the common drivers behind problem behaviours through a survey of abilities, value-based characteristics, beliefs, knowledge, and behaviours of snorkeller visitors at two popular yet contrasting sites.

This study drew on the foundational theories: the Theory of Planned Behaviour (TPB) (Ajzen, 1991), Value-Belief-Norm theory (VBN) (Stern et al., 1999) and Responsible Environmental Behaviour (REB) (Hines et al., 1987) and addresses the question of 'how do ability, value-based characteristics (beliefs, values, perceptions, opinions), and knowledge relate to the perceptions of damaging behaviours and self-reported in-water behaviours of snorkellers at Turquoise Bay and Oyster Stacks'**.**

**Study sites**

The two study sites, Turquoise Bay (TB) and Oyster Stacks (OS), are located within the World Heritage-listed Ningaloo Reef Marine Park, which is accessible from land via the adjacent Cape Range National Park. Ningaloo Reef is a fringing reef that stretches for over 300 km along the West Australian coastline approximately 1200 km north of the WA state capital city, Perth. As a fringing reef, visitors can easily access many parts directly from the shore (Jones et al., 2011). Located in an arid region of coastal Western Australia, the shore based accessibility is a major drawcard for snorkellers at both sites. While these sites are popular with snorkellers, they differ in visitation rates per year (TB: ~175,000, OS: ~48,000) likely owing to differnt coastal morphology: TB has a sandy beach and lagoon while OS has a rocky shoreline and is shallow.

**Methods**

Data was collected using a 45-question online social survey of visitors who snorkelled at the two study sites. The Department of Biodiversity, Conservation and Attractions contacted, via email, those from their visitor database who booked campsites in the adjacent Cape Range National Park during select months from September 2019 to March 2020. A total of 3,571 visitors were contacted: 571 accessed the questionnaire, of whom 424 completed it. All completed responses were used in analyses.

The survey consisted of multiple-choice and rating-scale type questions about self-reported attributes associated with the reef and snorkelling, including swimming ability, attitudes, perceptions, knowledge, and snorkelling behaviour. Chi-square tests, and Spearman's rank-order correlation or Cramer's V were used to identify relationships between variables. By identifying snorkellers' ability, value-based characteristics, and knowledge, whether and how these variables related and the strength of any relationship with snorkellers' perceptions of damaging behaviours and their self-reported in-water behaviours could be identified.

**Key findings**

Overall, those snorkellers who reported greater ability, greater knowledge, and pro-environmental values, were more likely to also report greater perceptions of damaging behaviour and fewer self-reported coral contacting behaviours.

*Attributes on Perceptions:*

This study found the association between self reported ability and perceptions of damaging behaviours was not useful because they hold a limited logical connection. Thus, the association produced is likely indicative of an underlying factor common to both, i.e. each act as antecedents of TPB's behavioural intention (see Ajzen (1991)). Furthermore, examining the association between envionmental values and perceptions of damaging behaviours as separate variables demonstrated that this approach is not particularly useful because both variables essentially measure elements of the same construct. Knowledge was weakly associated with perceptions.

*Attributes on Behaviours:*

Previous studies suggested there may be an association between snorkellers ability and in-water behaviours; the current study has provided evidence that those self reporting greater ability were more likely to report fewer coral-contacting behaviours.

There were a large proportion of significant associations between values and behaviours (Figure 1), with respondents reporting greater pro-environmental values and few coral-contacts overall. This result supports the findings of previous studies, to wit that strength of attitude can inform the predictability of behaviour, extending this knowledge to snorkellers in MPAs.

The associations between knowledge and behaviours indicated that those reporting less knowledge were more likely to report more frequent coral-contacts (and vice-versa) and that knowledge (of coral biology) source was associated with differing coral-contact rates: those with more formal knowledge sources reported the least contacts.

Overall, the associations between perceptions and behaviours supported the hypothesis while also providing insight into the differences between the visitor types across the two study sites: Turquoise Bay tended to attract general recreationalists whereas Oyster Stacks tended to attract visitors with more specific marine activity-based intentions and backgrounds.

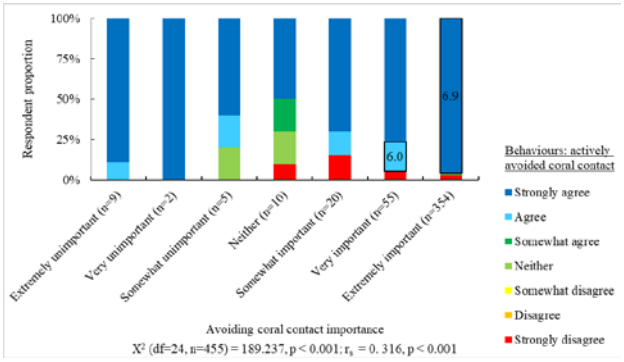


*Figure 1. The largest proportion of significant associations was between values and behaviours. A pattern of association is highlighted by the adjusted residuals (inserted into relevant proportions) demonstrates that those who report greater importance of avoiding contact with corals (Q30) were more likely to also report agreement with having tried to avoid contact with the corals (Q28).*

**Conclusion***:*

The results highlight the role that values play in snorkeller behaviours while also indicating a pattern amongst respondents which would benefit from further validation by in-water observation of snorkellers. Such knowledge would help inform management approaches, like tailored messaging, in order to target the normative belief that most people want to be seen doing the 'right' thing, which in the context of this study was not impacting the coral reef.

# 25 Centrality to life and the Theory of Planned Behavior: The case of musk ox safaris in Dovrefjell-Sunndalsfjella National Park, Norway

**Hilde Nikoline Hambro Dybsand**, **Stian Stensland**, The Norwegian University of Life Sciences, Norway

Ajzen's (1985) Theory of Planned Behavior (TPB) is one of the most recognized frameworks for understanding wildlife-related behaviors. According to this framework, intentions to perform behaviors can be predicted from attitudes, subjective norms, and perceived behavioral control. Behavioral intentions are evaluated as how likely a person is to perform a behavior in the future, with these intentions accounting for a considerable amount of variance in actual behavior together with perceived behavioral control (Ajzen, 1991). Involvement is another useful concept when studying behavioral outcomes, as highly involved participants can hold more intense attitudes and emotions, that may in turn influence future behavior (Burke & Stets, 1999; Havitz & Dimanche, 1999). Understanding a possible relationship between involvement and TPB may provide further insight on wildlife-related behaviors, as the literature suggests both concepts have effects on behavioral intentions. However, to the best of the authors' knowledge there are no previous studies combining TPB and involvement in a wildlife watching tourism context. Meanwhile, one of wildlife watching tourism's main justifications is its potential to improve participants' empathy and actions toward wildlife and the environment (Hughes, 2013). However, some activities are better suited for this purpose than others, and short duration and mass marketed activities oriented toward a single focal species may not have this effect (Curtin, 2013).

Our study investigates connections between TPB and centrality to life, a concept that is often used to measure involvement when studying participants' degree of recreation specialization (Scott & Shafer, 2001) and enduring involvement (Forgas-Coll et al., 2017). Additionally, we investigated participants' intentions to perform three pro-environmental behaviors that benefits wildlife following a wildlife watching experience. Organized musk ox safaris in Dovrefjell-Sunndalsfjella National Park was used as a case study, and data was collected through participant surveys. Participants who joined musk ox safaris during the 2018 peak season were asked to fill out a short on-site form (n = 487), followed by an online survey (n = 219, 52% response rate). The survey included 15 questions designed to investigate participants' perspectives on pro-environmental behaviors based on TPB (Ajzen, 1985) and four questions measuring participants' centrality to life. Responses to these questions were analyzed using three partial least squares structural equation models (PLS-SEM) that had R2 values of .46,.49 and .47, indicating satisfactory predictive validity (Hair et al, 2017).

Results showed that centrality to life had statistically significant positive relationships with participants' attitudes and subjective norms, whereas its relationship with perceived behavioral control was not significant. Furthermore, both centrality to life and the perceived effects of participating in a musk ox safari had positive relationships (directly or indirectly) with all three pro-environmental behaviors. Our findings indicate that involvement (measured as centrality to life in our study) can add further insight to the TPB, as positive relationships were found between centrality to life and two of TPB's dimensions. Additionally, findings can be useful to managers of national parks and other wildlife areas when deciding which wildlife watching tourism activities to allow. In areas with vulnerable species, it may not be possible to offer long duration wildlife watching tourism activities or involve all species found in the area. This study shows that a short duration guided wildlife watching experience based on one charismatic species may be a good option in these cases, as musk ox safaris typically lasted four to five hours and still had positive effects on behavioral intentions. Future product development should focus on fostering high involvement, positive attitudes and subjective norms, as both centrality to life and perceived effects of participating had stronger indirect effects through their effects on these elements than their direct effects on intentions to perform pro-environmental behaviors.


*Figure 1: Structural model analysis overview. Relationships between constructs are shown as standardized beta coefficients (first number on lines), followed by p-values (second number on lines in parentheses).*

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# Managing sustainable experiences in nature-based tourism

| SESSION | PART | DATE | TIME | CHAIRS |
|---|---|---|---|---|
| 1C | I | Tuesday 17th August | 14.00 – 15.20 CET | Hogne Øyan |
| 2C | II | Tuesday 17th August | 15.40 – 17.00 CET | Birgitta Ericsson |
| 4C | III | Wednesday 18th August | 14.00 – 15.20 CET | Monica Breiby |
| 5C | IV | Wednesday 18th August | 15.40 – 17.00 CET | Hogne Øyan |

| | Programme |
|---|---|
| *1C* | **151** The experiential value of national park visits |
| | **47** Niches in tourism- how do the entrepreneurs learn and interact? |
| | **125** Experiences of Co-Designing Tourism Product Strategy for Tourism Destination: Bottom-up approach |
| *2C* | **85** Tourism firms' perceptions on payments for ecosystem services model – Case: Landscape and Recreation Value Trade |
| | **93** Financing recreational trails through donations: Management challenges, visitor experiences and behavioural theory in a mountain biking context |
| | **170** Funding outdoor recreational opportunities in Germany– conceptual foundations and state of literature and data |
| | **118** Evaluating the impact of mobile apps on nature-based tourism experiences |
| *4C* | **103** Challenges and potentials of sustainable ecotourism management and conservation: A case study of Kanneliya rainforest in Sri Lanka |
| | **101** Exploring the association of trip characteristics and motivations with pro-environmental outcomes of Antarctic tourists: An analysis based on PRE and POST surveys. |
| | **100** The second home industry in Norway - management, and sustainability |
| *5C* | **136** A participatory assessment of the USDA Forest Service Southwestern Region's sustainable recreation strategy |
| | **137** Impacts and trade-offs of alternative transportation systems in U.S. National Parks |
| | **56** Managing sustainable development in recreational and protected areas |

# 151 The experiential value of national park visits

**Esko Sorakunnas**, University of Eastern Finland, Finland

**Conceptual framework: experiential consumption and consumer value**

The marketing discipline offers suitable and well-established constructs for viewing outdoor recreation from the demand perspective, namely experiential consumption (Holbrook and Hirschman 1982) and consumer value (Woodruff 1997, Holbrook 1999). Although non-commercial, visiting national parks represents consumption in terms of acquiring experiences; visitors immerse themselves in an experiential, nature-based context to derive personal experiences that provide value. The concept of consumer value has been established in marketing for long, but self-organized and independent visits to national parks represent a new area of application. This approach, viewing park visits through the eyes of the visitors, combines the setting attributes and individuals' activities to their desired personal outcomes. Thus, it is similar to the Outcomes Focused Management approach (Driver, 2008) as well as the Recreation Preference Scale (Driver, 1983) and Recreation Opportunity Spectrum (Clark and Stankey, 1979) frameworks, but provides an integrated outlook by comprising also the underlying universal values unlike conventional outdoor recreation research.

**Empirical research**

Two qualitative research projects were conducted to explore the experiences and perceived consumer value of national park visitors. The first one focused on the drivers and dimensions national park experiences – what people experience during their visit. Wilderness huts' guest book entries written by visitors 1970 – 2016 provided its rich, naturally occurring and longitudinal empirical material. Purposive sampling yielded 200 narratives for qualitative content analysis. The subsequent study focused on the value of park experiences using 49 introspective, in-depth soft laddering interviews. Their means-end approach explored visitors' dynamic construction of value disclosing the causal connections between attributes, consequences and universal values.

The main value types that emerged in these two inductive studies were nature, setting attributes, physical accomplishments, mental benefits and social interaction. Natural values represented the reason of visiting, the substance of parks while the setting attributes were instrumental facilitators of the visits. Once on-site, outdoor recreation was a physical activity expressed as personal accomplishments and self-efficacy. Typically, these three domains - nature, setting attributes and physical exertion - represented concrete attributes and visitors' manifest values. More abstract, emotional consequences could be found in the narratives as latent content and they were revealed during the interviews by elicitation. These types were connected to mental benefits, freedom and escape and social interaction that provided a relaxing break and recovery from a hectic ordinary life. Hence, the findings of a consumer value approach were similar to experiential studies on nature-based tourism and national park experiences (cf. Sorakunnas, 2020, p.3).

Social interaction with other people turned out to be a significant value component. It was expressed as enjoying the company of friends and family members, a sense of belonging to a hiking community, and virtual togetherness with friends via social media. Thus, social value was both extrinsic and intrinsic, active and reactive, which complemented established value typologies (Holbrook, 1999; Sheth, Newman, & Gross, 1991) that regard it solely as other-oriented impression management.

Consumer value was investigated in two different types of Finnish national parks. One was a large, remote wilderness park ("Wild") and the other was a small, urban park located close to major cities ("Urban"). These two parks offered similar types of value to visitors, but on different levels. The Urban park provided convenient access to nearby nature offering fresh air, time with friends and a few hours relaxing break from a stressful ordinary life. Visits to the Wild park required more planning and investments, but also their value was perceived greater. This was due to specific value dimensions not perceived in the Urban park and also common value dimensions were experienced more intensively in the Wild.

**Managerial implications**

Social value that emerged in this study presumably contributes to consumer value also in other nature-based contexts. Service providers' influence on this type of value is limited, because it rests heavily on the situation and interaction with other people. Indirect ways of influencing the construction of social value include destination profiling, customer segmentation and managing group dynamics.

For national park management in particular, this study demonstrated the usefulness of the consumer value approach also in a non-commercial outdoor recreation context. Consumer value views parks' offerings through the eyes of visitors revealing a value landscape with diverse subjective value types and dimensions. The value approach encourages shifting attention from the tangible setting to visitors' subjective outcomes - what they desire and get when visiting a park thereby complementing traditional attribute-based management.

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## 47 Niches in tourism- how do the entrepreneurs learn and interact?

**Kristin Løseth**, Western Norway University of Applied Sciences, Norway

While the tourism industry pre-pandemic was steadily growing worldwide, it has often been portrayed as a sector with challenges tied to knowledge development and innovation. This has been explained by the industry being dominated by small and medium sized businesses, high levels of labor turnover, challenges tied to seasonality, rapid changes of ownership and lack of dedicated career ladders (Hjalager, 2002). The nature of the tourism experience makes cooperation necessary in the industry, but the small scale of the businesses means limited resources for network cooperation. The fragmentation of the industry may also halt cooperation, as it consists of entities of different scales from different areas, that hinders communication and knowledge transfer (Czernek, 2017).

Instead of trying to cover the whole of a fragmented industry, this research will examine knowledge development in businesses that offers similar products. Aldrich and Fiol (1994) use the concept of organizational populations to describe groups of organizations with similar products and/ or processes. Research on knowledge transfer in tourism indicate that businesses with similar product products has the potential for more specific learning, and more direct imitation (Weidenfeld et al, 2010:610), and that product similarity is positively related to exploitative knowledge transfers resulting in innovation (Weidenfeld et al, 2010; Sørensen, 2007).

Aldrich and Fiol (1994) argue that new populations struggle with challenges of organizational knowledge development and legitimacy. This is tentatively supported by findings from research on different adventure tourism activities (Løseth, 2014). Through research question 1 the aim is to learn more about how a population evolves, and thus provide important input on how and where authority means can be placed:

Research question 1: How does challenges concerning product maturity influence knowledge development in the businesses?

The case of this study is the niche of mountain guiding in Norway. While mountain guiding in Norway has its roots back in the 18th Century, the development of businesses offering mountain guiding year-round is fairly new. The providers are still few, providing a lucid material for research on the ongoing processes.

In a fragmented industry it is expected that actors will find different networks and forms of corporations relevant for their business development. In a theoretical review, Høegh-Guldbrandsen and Fuglesang (2016) discuss five such forms of cooperation: Dyadic relations, innovative communities of practice, social networks, destinations and systems of innovation. Research question 2 will examine cooperation in the niche of mountain guiding:

Research question 2. What characterizes cooperation and knowledge development in the niche, and what sources of knowledge and forms of cooperation are experienced as important for the actors?

12 interviews were conducted with guides and owners of mountain guiding businesses in Norway. The sampling was in part snow-balled as an early pilot interview in the spring of 2017 with a guide who has worked extensively in the industry and has held different positions in industry-relevant organizations gave access to his network. 11 interviews were conducted face-to-face, one digitally. In order to accomplish a broad understanding of change processes taking place in the mountaineering industry, the strategically chosen interview sample includes guides and owners who have been working in the industry for decades as well as guides and owners that are fairly new to the industry. The sample includes guides from four different mountain regions in Norway. Content analyses was used to organize and analyze the material.

Findings, research question1. In line with Aldrich and Fiol (1994) the findings suggest that product maturity affect cooperation and knowledge development in the mountain guiding businesses. While mountain guiding has a long history in Norway, this type of guiding has been centered around a few “trophy mountains”. Starting up a guide business in a mountain region with little or no history of this type of activity, means a different set of challenges for the

entrepreneurs. Here, entrepreneurs must to a greater degree build knowledge and legitimacy locally and regionally, than entrepreneurs in mountain regions more familiar with this type of economic activity. The lack of product knowledge and legitimacy is also reflected in tourism projects that are experienced as having little relevance for the mountaineering business.

Findings research question 2. The material reveals a strong identity tied to being a mountain guide and strong ties to other actors within mountaineering businesses. This was reflected in high levels of cooperation with other mountaineering businesses, were guides travel to different mountain areas and work both for their own company as well as for others. This fluidity ensures knowledge is being transferred not only regionally, but also nationally and internationally.

The characteristics of the mountain guiding niche make Wenger's theory of communities of practice (Wenger & Snyder, 2000) highly relevant, were in this case knowledge is being developed and centered around the craft of mountain guiding. The community of mountain guides is a valuable source of knowledge, identity and support, but the role of boundary spanners (Newell, et al, 2009) is also obvious in the material.

At the policy level, Wenger and Snyder (2000:140) describe the challenges of interfering and supervising the spontaneous and informal communities of practice. Instead of traditional projects tied to knowledge management, different ways of cultivating the community may be more a more fruitful path.

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# 125 Experiences of Co-Designing Tourism Product Strategy for Tourism Destination: Bottom-up approach

**Agita Livina**, **Iveta Druva-Druvaskalne**, Vidzeme University of Applied Sciences, Latvia

**Introduction**

Management issues of tourism destination highlight collaboration among involved stakeholders, their engagement in planning processes, functions and responsibilities, particularly hot item is sales of tourism destination and tourism products (Mariani et al. 2013; Mackay et al. 2020).

The purpose of the paper is to show development process of tourism product strategy development initiated by bottom -up approach.

**Study area**

The territory of Latgale region is in the eastern and south-eastern part of Latvia. 260,226 people live in this region (2019) and the area is 22.5% of the territory of Latvia. The region stands out with its untouched natural resources: Rāzna National Park, nature parks, lakes, rivers and the hilly terrain.

In most economic indicators, Latgale region ranks last among the regions of Latvia. The offer of the tourism and leisure sector is mainly a source of additional income for the locals and not their main occupation.

In conditions when the economic development in the region is relatively lower, but there are natural resources, incl. specially protected nature areas, it is rather difficult to achieve a common understanding of tourism development and management. The Latgale Region Tourism Association has been operating in the region since 1994, as well as the Latgale Planning Region, the functions of which are regional development and investment attraction. In addition, there are also six local action groups, and until June 2021 there are 21 local governments in the region, so there are on average 20 tourism information centres or points in the region. The Nature Conservation Agency (NCA) has Latgale Region Administration, the company "Latvia's State Forests" (LVM) has two regional offices in this region.

In autumn 2019, local action groups initiated the development of the Latgale region business development strategy "Development of companies' tourism services", which is planned to be integrated into the community-led local development strategies of local action groups, thus envisaging activities for tourism product development in the period until 2027. The main sections of the strategy:

- Analysis of the current situation, including SWOT analysis, demand analysis - in the form of a survey, interviews with entrepreneurs, tourism object managers.
- Latgale tourism service providers, perspectives, face-to-face and online workshops.
- Action plan to achieve the goals, 5 focus group seminars.
- Strategy implementation performance and monitoring indicators.

**Methodology**

The authors of this article planned, organized and developed this strategy as well as they have obtained experience in elaboration of tourism development planning documents for other areas. The methodology of the strategy development included intensive involvement of stakeholders, mainly entrepreneurs, tourism specialists in municipalities and representatives of local action groups.

The authors of this article as tourism industry experts participated in seminar cycles with local entrepreneurs, local action groups, conducted surveys, interviews and visits (34 different tourism service providers) at Latgale tourism industry companies in cooperation with students of Vidzeme University of Applied Sciences. There were used as secondary data as national statistics, other statistics, review of policy planning documents.

An online survey of entrepreneurs and potential entrepreneurs was conducted. An online survey of the local inhabitants of Latvia was conducted with the main aim of finding out the demand for services in region.

**Description of destination**

There are 583 tourism and leisure companies (2020) have been registered in Latgale region (tourist accommodation, catering services, travel agency and

tour operator services, guide, rental, cultural and sports events service providers).

At the end of 2019, according to statistical data, there were 96 different types of tourist accommodation (CSB, 2020). About a third (31.4%) correspond to the type of guest houses, 22.3% are holiday homes, there are relatively fewer campsites (3.9%).

According to the information provided by the Latgale Tourism Association "Ezerzeme", there are 34 nature trails in Latgale. Work has begun on the development of a long-distance hiking route (1060 km) in Latgale – Ezertaka ("Lake trail"). Rāzna National Park is one of tourism attraction magnets of Latgale.

**Discussion and conclusion**

Each strategy requires a responsible institution and a team that implements and monitors the planned actions. In the Tourism Product Development Strategy for Latgale Tourism Destination, actions were divided into two groups: 1) priority groups of tourism products to be developed and 2) support actions for the development and provision of tourism products.

In particular, the development of the group of supportive actions was the most complicated and required the search for compromises between the involved parties. The development of the strategy was initiated by the local action groups (bottom-up initiative), but at the same time the implementation and responsibility for several actions applies to higher level. In planning, the hierarchy of development document drafting follows a top-down approach. Consequently, this experience is different when a regional development strategy is developed from the bottom up. Turning to higher-level institutions with initiatives and actions requires courage. However, it can be concluded from the discussions during the development of the strategy that there is a lack of mutual communication between the developers of various tourism projects.

With the increasing digitalisation of services, including tourism, tourism management structures should keep pace with the times and transform (Hartman et al. 2020). If we talk about the development of nature tourism services in Latgale region, it would be equally important to involve the NCA and LVM in discussing various tourism issues.

In tourism, local inhabitants of Latvia primarily see this region as an opportunity to relax in nature, which is a great value, which is especially appreciated in the conditions of the COVID-19 pandemic. In conclusion, it must be acknowledged that the process of developing the strategy highlighted the problem of cooperation and coordination in sustainable tourism planning at the regional level, both in cooperation among institutions and among companies, especially near water bodies.

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# 85 Tourism firms' perceptions on payments for ecosystem services model – Case: Landscape and Recreation Value Trade

**Henna Konu**, **Liisa Tyrväinen**, Natural Resources Institute Finland, Finland

Countries with abundant natural environments have recently attracted growing number of tourists motivated mainly by the variety of nature-based activities and attractions. The nature is the core resource in nature-based tourism and hence quality of nature as well as its accessibility are essential for service providers (e.g. Fredman & Tyrväinen, 2010). Although tourism industry benefits directly or indirectly from nature and landscape conservation, it is not usually actively engaged in or contributing to these targets. One reason for this is the lack of diverse incentives and models that enable the contribution easily (Konu & Tyrväinen, 2020).

Therefore, new instruments, such as Payments of Ecosystem Services (PES) models, are needed in nature-based tourism areas to secure the natural environments and enhance the quality of forest landscapes (e.g. Tyrväinen et al. 2014, Mäntymaa et al., 2019). The PES policies compensate communities or individuals for taking actions that support and increase the provision of ecosystem services (Jack et al., 2008). It is noted that to be efficient and generally accepted a PES scheme should be both socially and environmentally robust and fulfil the needs of stakeholders involved (Reed et al., 2017). Hence the participatory approach and mapping stakeholder perceptions have a central role in developing PES models.

This case study introduces a tourism-related PES model that will be funded by tourism sector to support landscape and recreational values of forests in Ruka-Kuusamo tourism area in northern Finland. The main idea of the Landscape and Recreation Value Trade (LRVT) is that tourism industry would compensate the loss of income from timber sales for the private forest owners, if they commit to sustain cultural ecosystem services such as biodiversity and landscape values in their forests (Tyrväinen et al., 2014; Mäntymaa et al., 2019). The focus of the model is to safeguard older forests that are already in regeneration stage and to avoid clear cuts or other intensive logging in sites important for landscape and biodiversity protection, and for tourism. As the aim of the LRVT is to gain funding from the tourism sector, the perceptions of tourism firms have a central role for the success of the scheme. The purpose of this study is to increase understanding of tourism firms' perspective on a suggested LRVT scheme development and implementation.

The data is collected with semi-structured thematic interviews during the winter 2019 and spring 2020 in the case area. The interviewees were selected purposively to gain perspectives from different sized tourism firms (CEOs, managers or owners of the firms). The half of the interviewees were selected by the recommendation of the CEO of local tourism association and the suggested interviewees were regarded as the central tourism actors in the area. Smaller firms were selected to represent actors using nature as their operational environment. A total 9 interviews with 10 interviewees (one interview was conducted for the two owners of one firm).

The findings show that the tourism firms were not too familiar with the idea of LRVT. However, after explaining the purpose and the basic idea of the LRVT, the tourism firms' attitudes towards the model were generally positive as it was seen to support sustainability in a tourism destination. The interviewees identified diverse benefits that the LRVT can bring to the destination and for the tourism firms, e.g. it can be linked to wider sustainability and development activities in the area, it can help to maintain and enhance the nature and the landscapes, it can influence positively to customer experiences, it can bring new business opportunities and decrease tensions between tourism and forestry sector. Identified challenges of the LRVT were connected, for instance, to the concerns of possible free-riding behaviors and practicalities in putting the model in operation.

The motivations for firms to participate LRVT were manifold. Tourism firms have often adopted sustainability practices that support ecological sustainability by saving resources, such as saving water and electricity, to gain cost savings (e.g. Font et al. 2016). In this LRVT case, these kinds of motivations

were not evident as the direct connection of LRVT to business performance was not evident. Nevertheless, it seems that the more altruistic motivations to act sustainable way are growing among entrepreneurs. The diversified motivations also influenced on the willingness and ways to involve and contribute to LRVT.

The study also has managerial contributions as it brings forth tourism firms' perspectives how the model should be organized in practice. The findings of the study can be utilized in designing the acceptable PES model and in planning the awareness raising campaign in the area. The findings brought forth insight for the hoped management structure of the process as well as ideas how the contributions could be collected. Currently, this kind of local and non-governmental funded tourism related PES initiatives are rare. Nevertheless, there is a growing pressure to find also local solutions to tackle the global sustainability challenges and well-designed PES models can be one tool that can help to reach diverse sustainability goals at local level.

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# 93 Financing recreational trails through donations: Management challenges, visitor experiences and behavioural theory in a mountain biking context

**Marie Nowak**[1,2], **Tobias Heldt**[1], [1]Dalarna University, Sweden. [2]Mid Sweden University, Sweden

**Background**

The demand for outdoor recreation has significantly increased over the last decade, and along with this the pressure on financial resources required to develop recreational infrastructure in nature areas. Fiscal and regulatory policies to generate the necessary funding are often neither ideologically nor legally accepted in countries where the right of public access applies, which is particularly broad in scope in the Nordics. Local stakeholders are thus reliant on voluntary contributions of visitors as one funding source (Sandell & Fredman, 2010). However, since these are often insufficient to cover the costs of infrastructure development, new strategies are called for to realise the benefits of trail-based recreation in the Nordics, without impeding the right to roam and the welfare of the natural environment (Sandell & Fredman, 2010).

Soft policy approaches enhanced with insights from behavioural economics may offer such alternatives (Heldt, 2005). Recent research in this field provides strong arguments that consideration of social and psychological factors can increase the effectiveness and efficiency of soft policies (Avineri, 2012; Thaler & Sunstein, 2008). Behavioural theories like the Norm Activation Model (Schwartz, 1977), Theory of Planned Behaviour (Ajzen, 2012), and Conditional Cooperation (Frey & Meier, 2004) have thus increasingly been used to study different pro-social behaviours and to inform policies accordingly (Testa et al., 2018). Despite their success in various field, behaviourally informed policies are still rare in the management of nature areas.

This paper uses a field experiment approach to test the influence of behaviourally informed messages on the donation behaviour of mountain bike (MTB) trail users. The context is Sweden, due to the countries' unique public access rights (Sandell & Fredman, 2010). The practical research implications concern the development of behaviourally informed policies to enhance funding for recreational nature areas in public access settings. We add to the literature by testing behavioural theory to encourage pro-social behaviour in a yet underexplored context of tourism i.e. MTB.

**Research design**

The field experiment took place in Rörbäcksnäs, a small village located in the Dalarna county 35km west of Sälen. Renowned for its natural trail qualities, Rörbäcksnäs has experienced significant growth in MTB visitors over the last decade. The trail management is entirely based on the voluntary work of the local sports association, which uses visitor donations collected in a 'Karma account' to finance the materials for trails. However, these are insufficient for further development. Currently, a signpost at the trail entrance invites visitors to contribute with basic information about the use of donations.

The research was conducted over an eight-month period and involved a pre-study and the actual field experiment. The pre-study included interviews and cooperation with the local community group to define their goals and barriers for MTB development. Following this, we developed surveys and counting instruments for the field experiment (baseline + treatment phase) which we conducted during MTB high season, between June and August.

The baseline condition was the existing signpost with a suggested amount and some altruistic appeals. Informed by attribution theory, NAM and reciprocity, we hypothesized that making the norm to donate salient in a message, using a descriptive norm, suggested amount and framing increases the share of donations and donation amount. Accordingly, we changed the signpost in the treatment condition. Figure 1 shows the original message on the left side, and the treatment condition on the right.



*Figure 1* Donation messages accompanying the Karma account

**Results**

204 responses entered the analysis stage.

We found that the bikers' donation behaviour was affected by the normative message. A little over 50 percent donated (any amount) in the baseline condition. In the treatment condition this increased to roughly 70 percent. A chi-square test indicated a significant difference between the share of donators, which demonstrates that the normative message affected the donation behaviour. The amount also increased from an average of 64.71 SEK to 90.50 SEK.

**Results 2: Beliefs about others drive behaviour**

Running a regression analysis to explain the decision to donate (discrete yes/no decision), we found the effect of the treatment positively significant at a 10 percent level, even after controlling for several other variables that might influence the behaviour. This indicates that beliefs about others drive the donation behaviour.

Our results support the thesis that normative information increase conformity (Frey & Meier, 2004). A variable capturing personal norm emerged furthermore as significant, adding positively to the likelihood of donating. The responses indicate strong personal norms in favour of donating. 'Kilometres biked' was found to be another significant variable, meaning the longer the distance biked, the higher the likelihood of donating.

**Implications**

Based on our finding it appears that activation of socials norms to donate for MTB trails encourages higher donation rates and average donation amounts. Normative messages seem to appeal to conditional contributors while not deterring those that already endorse donations. This is consistent with our prediction and findings in other pro-social contexts (Frey & Meier, 2004; Heldt, 2005). Whilst the requirements of recreational infrastructure and existing support varies between destinations, our findings imply that normative messages can provide effective strategies to boost pro-social behaviour in a context where a certain level of social support towards funding already exists. As non-costly and freedom preserving policies, normative interventions can easily be implemented by those involved in the management of recreational trails. However, for managing a sustainable destination in which the recreational trail network is a key driver, one needs to recognize the risk of backfiring on the visitor experience if the norm is made too salient (Bolton et al., 2020).

Our study is one of few that test normative interventions in a recreational public good context, and the first that is informed by several behavioural theories and links behaviour to the visitor experience.

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# 170 Funding outdoor recreational opportunities in Germany– conceptual foundations and state of literature and data

**Volkmar Hartje**, Technische Universität Berlin, Germany

A lot of the economic research on the management of visitors in recreational and protected areas focuses on the demand side (what makes visitors tick). It asks how management could relate/ react to the needs, interests, behavior of visitors to make the recreational experience worthwhile for these visitors. This is to a large extent due to the methodological advances in valuing recreational decisions. Comparatively, the amount of research on the supply side of recreational opportunities has been rather small.

The standard economic analysis of supply of other (e. g. consumer) goods (in economic terms private goods) focuses on the need to make the necessary resources available for the production of these goods, looks at the cost implications and sees how prices develop to cover these costs and how they fund the supply of these goods. This analysis has been applied to recreation as a recreational production process by Loomis & Walsh in their textbook in 1997. Within this approach, a public supply of recreational opportunities is combined with a household production involving time, money skill equipment to generate visitor use of the area (p.14).

I would like to propose a differentiation of their model, by pointing out that outdoor recreational opportunities are not managed jointly as a public supply (as in the National Parks in the USA), but that the major inputs to recreational opportunities (land, landscape qualities, water bodies, access, ancillary infrastructure, information about the opportunities and users' knowledge for use) are often provided separately, by different providers and funded by varying sources. This is the case in Germany and it can be observed in other countries as well. The inputs vary by the outdoor activity undertaken and the resulting necessary combination of inputs required. As a consequence, the analysis should be undertaken in an activity-specific manner, i. e. separately for hiking, biking, bathing, angling, mountaineering, canoeing, asf. and specific by the inputs they require (e.g. for hiking access to land, trails, narratives, signs, visual quality).

As the inputs are provided separately, their funding sources vary. Here, the conceptual foundation relies on the distinction in economic theory which differentiates between public goods, club goods and private goods which are theoretically connected to ideal funding sources, taxes, member fees and prices respectively (Stiglitz, Rosengard 2015) Empirically, the picture is mixed and there is a variety of funding sources: Taxes play a prominent role with contributions from users as part of the association to undertake outdoor recreation activities. The funding sources of taxes are multisectoral and are of multiple sources from various federal levels, developed in a context of grantsmanship, making the total sources difficult to assess. With access to land and water bodies largely free in Germany, there are few expenditures for land purchases (as opposed to the USA), but the ancillary infrastructure and the necessary information have to be paid for and funded, similar to the USA, but the funding structure is different (cp. Banzhaf, Smith 2020). In addition, personal equipment, transport and lodging has to be funded, but in both areas via the supply structure of the respective markets.

I propose to use the approach of economics of supply to the management of recreational opportunities, to adjust it to outdoor recreation to provide an analytical framework and illustrate with a number of examples based on recreational outdoor activities. Based on this framework, I will summarize the available information on costs and funding, based on official statistics and the literature. The ultimate question is then how much of the expenditures made to fund recreational opportunities in Germany is discernible and how large is the share of governments?

The starting point is the analysis of the inputs necessary to gain a positive recreational experience (cp. Loomis, Walsh 1997): (1) A component of nature/the environment at a particular site central for the activity, (2) control over the use of this component (3) access to the component from the residence of the user, (4) ancillary infrastructure at the site (usually man-made), (5) equipment for the visitor for

his/her use at the site (6) training of the visitor using the equipment /(7) training of/ information for the visitor using the site (8) for tourists means for staying overnight. These inputs are managed by the visitors (5,6,7) and by a providing agency (1,2,3,4) which is usually thought to be a governmental agency, modelled after the US National Park Service. This is understandable given the development of the field, but it does not cover the variety to be observed in the field. In Germany, the available information of costs and financing is scattered among various stakeholders (various recreational associations and industries and selected government agencies), but an overall picture is difficult to assemble. The aim of the presentation is to provide a conceptual framework and to assemble available information, but not to give a complete and coherent summary of the costs and funding of outdoor recreation. Instead, an assessment of the existing situation and a gap analysis is pursued.

The supply of opportunities will be illustrated with examples of the inputs of specific outdoor recreational activities, e.g. angling, horseback riding, canoeing, rock climbing, alpine skiing, hiking., based on the situation in Germany: Take angling as an example: For angling the central resource is the fish population in waterbodies (with some relevance of the surrounding landscape), which are privately and publicly owned (usually outside protected areas) and their angling use is rented to anglers' associations which manage the water body (maintain/improve the habitat) and the fish population (often restock them based on hatcheries). Anglers have to pass a competence test for which courses are provided by the anglers' clubs and they have to buy a permit from the association or the owner of the water body. Permit payments and membership dues and voluntary contributions cover the costs of maintenance of the water bodies and of governmental regulation. The visitors pay for their equipment and for access (important markets; particularly for offshore angling). External costs result from overstocking and are regulated. For some of these components, data are available on different levels, but it is not possible to assemble a complete picture based on publicly available information. (cp Arlinghaus, 2004).

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## 118 Evaluating the impact of mobile apps on nature-based tourism experiences

**Tatiana Chekalina**, **Matthias Fuchs**, European Tourism Research Institute, Mid-Sweden University, Sweden

The study focuses on the evaluation of the impact of applications developed for smartphones intended for usage in connection with nature-based tourism (NBT) experience. Outdoor recreationists increasingly use mobile applications to interact with nature by consuming, creating and sharing the content related to NBT experience before, during and after the trip (Wang et al., 2014; Dickinson, Hibbert, and Filimonau, 2016). We argue that both, content and the various elements of mobile apps functionalities show the capacity to enhance major aspects of the NBT experience, such as emotional, social and epistemic experience value, as well as excellence, efficiency and safety (Chekalina, Fuchs, and Lexhagen, 2018). NBT segments utilize various functional elements of mobile apps (either web-based applications or native apps users need to download and install on their smartphones), such as map-based information, weather/avalanche warnings, augmented reality and 360 images, QR-code tags and geocaching, location-based services, near field communication (NFC) and mobile payments, as well as social media integration (Buhalis and Foerste, 2014; Kolas et al., 2015).

Prior research identifies various categories of apps, which can enhance the NBT experience (Chekalina, Fossgard, and Fuchs, 2021). Digital reference books replace printed guides of birds, plants, mushrooms and integrate image recognition and augmented reality technology. The categories of “exercise and training” apps and “map and navigation” apps show similarities in terms of content and functionality. However, the former category focuses on performance, such as pace, distance, elevation or calorie consumption, while the focus of apps in the latter category is on tracks, routes and attractions. Other categories of apps include travel guides, weather apps, games, compass apps, flashlight apps, apps for photo and video, as well as niche social media networks (Chekalina et al., 2021).

The capacity of mobile apps to enhance the NBT experience relates to multidimensional experience value and, specifically, the particularly nature-based sub-dimensions of value, namely, relaxation, escape, fun, excellence, efficiency, safety, development of knowledge and skills, the joy of being with family and friends, etc. (Chekalina, Fuchs, and Lexhagen, 2018). From the value-co-creation perspective (Vargo and Lusch, 2004), a mobile app installed on a person’s smartphone is an additional resource, which can be integrated with other tourists’ resources (e.g. money, time, skills, equipment) and destination resources (e.g., amenities, activities, attractions) and, thus, contribute to the value of NBT experience. At the same time, Dickinson, Hibbert, and Filimonau (2016) reveal that in the context of NBT experience such as camping, the use of smartphones represents a dilemma. Specifically, at least 50% of campsite tourists view mobile devices as a potential distractor and demonstrate a need for mobile ’disconnection‘ to fulfil the desire to ’escape‘ (Dickinson, Hibbert, and Filimonau, 2016).

The primary research question of our experimental study is asking how the use of a mobile app designed for outdoors impacts various aspects of nature-based tourism experience and, in particular, takes into account the conflict between the needs for disconnection and escape, which are considered essential motives of NBT and outdoor recreationists. Particularly, we designed four scenarios of using a mobile app for a hiking experience before, during and after the trip. An additional base-line scenario describes planning, conducting and remembering a hiking trip without the use of a mobile app. After conducting a pilot test with a student sample in summer 2019, a full-scale panel data collection took place in Sweden during December 2019 resulting in 733 usable responses.

The online survey experiment with independent treatment groups (Table 1) indicates that the use of mobile apps designed for planning the trip and navigating along the route significantly enhances particular aspects of anticipated outdoor experience, such as being prepared for the journey, possibilities for physical exercise and learning new things at the outdoors. At the same time, however, and in line with the disconnection dilemma as revealed by Dickinson et al. (2016), the use of the mobile app is also perceived as disturbing in fulfilling primary needs of

the NBT experience, including relaxation, connection with nature, peace and quietness, slowing down, escaping routing environments, etc.

Interestingly enough, experiment results demonstrate that enhancing the app with a meditation and disconnection functionality not only eliminates the disconnection dilemma but also facilitates anticipation of other aspects of NBT experience, including eudemonic value related to sense of purpose in life and having time for self-reflection, as well as feeling safe and comfortable during the hiking trip (Badran et al., 2017; Walsh et al., 2020).

| Dependent Variable | Cumulative % of Variance Explained | Factor Grand Mean[c] | One-way ANOVA | | Multiple comparisons | | | | |
|---|---|---|---|---|---|---|---|---|---|
| | | | F | Sig. | (I) Scenario | (J) Scenario | Mean Difference (I-J) | Std. Error | Sig. |
| Factor 1. Relaxation and escape[a] | 48,93 | 4,07 | 6,125 | <0.001 | A | AB | 0,302 | 0,104 | 0,039 |
| | | | | | AB | A | -0,302 | 0,104 | 0,039 |
| | | | | | | AC | -0,405 | 0,106 | 0,002 |
| | | | | | | D | -0,408 | 0,097 | <0.001 |
| | | | | | AC | AB | 0,405 | 0,106 | 0,002 |
| | | | | | D | AB | 0,408 | 0,097 | <0.001 |
| Factor 2. Safe and comfortable[b] | 56,46 | 3,36 | 6,436 | <0.001 | AC | D | 0,435 | 0,103 | 0,001 |
| | | | | | ABC | D | 0,436 | 0,101 | 0,001 |
| | | | | | D | AC | -0,435 | 0,103 | 0,001 |
| | | | | | | ABC | -0,436 | 0,101 | 0,001 |
| Factor 3. Knowledge and skills[b] | 60,38 | 4,02 | 4,06 | 0,003 | A | D | 0,272 | 0,085 | 0,038 |
| | | | | | D | A | -0,272 | 0,085 | 0,038 |
| Factor 4. Eudaimonia[a] | 63,11 | 3,68 | 4,121 | 0,003 | AB | AC | -0,395 | 0,117 | 0,009 |
| | | | | | | ABC | -0,356 | 0,125 | 0,046 |
| | | | | | AC | AB | 0,395 | 0,117 | 0,009 |
| | | | | | ABC | AB | 0,356 | 0,125 | 0,046 |

Note: The extraction method was principal axis factoring with direct oblimin rotation. KMO Measure of Sampling Adequacy = 0.960.
The table shows the mean difference significant at the 0.05 level.
a. – Tamhane post hoc test; b. – Scheffe post hoc test.
c. *1 = strongly disagree; 2 = somewhat disagree; 3 = neither agree nor disagree; 4 = somewhat agree; 5 = strongly agree*
A – plan and navigate; B – journal; C – meditate and disconnect; D – base-line scenario without the use of a mobile app

*Table 1.Results of one-way ANOVA with post hoc test comparing five scenarios of mobile app usage on four hiking experience value factors*

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# 103 Challenges and potentials of sustainable ecotourism management and conservation: A case study of Kanneliya rainforest in Sri Lanka

**Indi Akurugoda**, **Manjula Karunaratne**, University of Ruhuna, Sri Lanka

Tourism has become a major income source in the Sri Lankan economy. During 1980s, beach tourism was a prominent industry in Sri Lanka. This trend has been changed over time and according to the new world trends. At present, tourism has various sub-divisions such as ecotourism, agro-tourism, adventure tourism and heritage tourism (Fernando & Meedeniya, 2009; SLTDA, 2015). Out of these, ecotourism can be identified as the most popular and fastest growing sub-division of the tourism industry (Donohoe & Needham, 2006; Page & Dowling, 2001; Fennell, 2003).

Ecotourism, according to Fenell (2001) is 'traveling to relatively undisturbed or uncontaminated natural areas with the specific objective of studying, admiring and enjoying the scenery and its wild plants and animals, as well as any existing cultural manifestations (both past and present) found in these areas.' Fennell (2001) identifies five of the most frequently cited variables within ecotourism: (1) reference to where ecotourism occurs (natural areas); (2) conservation; (3) reference to culture; (4) benefits to locals; and (5) education. The practice of ecotourism has generated interest of many stakeholders as it attempts to satisfy contrasting conservation and tourism development needs (Donohoe & Needham, 2006). For Das & Chatterjee (2015), proper management of the ecotourism sites at each of economic, social and environmental could help in the long-term conservation.

The increasing popularity of ecotourism industry, on the other hand, has developed risks to the natural environment upon which it depends, to the environmental ethics upon which it has been conceptualized and to the legitimacy of the ecotourism industry itself (Boo, 1990; Adams, 2009). Certification of ecotourism faces accusations of greenwashing (Haaland & Aas, 2010). Due to lack of proper management of protected areas and environmental consciousness among the tourists, ecotourism does not always serve the purpose of conservation (Das & Chatterjee, 2015). Sri Lanka faces the same issue towards developing ecotourism industry. Based on the ecotourism practices in the Kanneliya rainforest, this research explores why the ecotourism practices in Sri Lanka are unable to manage sustainable experiences and conservation initiatives simultaneously. The research identifies challenges and potentials of ecotourism practices in Sri Lanka.

This research adopts the definition developed by The International Ecotourism Society (TIES). TIES defines ecotourism as, 'responsible travel to natural areas that conserves the environment, sustains the well-being of the local people, and involves interpretation and education' (TIES, 2015). Along with this definition, TIES identifies that those who participate and implement ecotourism activities should adopt the following principles: 'minimize physical, social, behavioral, and psychological impacts; build environmental and cultural awareness and respect; provide positive experiences for both visitors and hosts; provide direct financial benefits for conservation; generate financial benefits for both local people and private industry; deliver memorable interpretative experiences to visitors that help raise sensitivity to host countries' political, environmental, and social climates; design, construct and operate low-impact facilities; and recognize the rights and spiritual beliefs of the indigenous people in your community and work in partnership with them to create empowerment' (TIES, 2015). The research was based on the assumption that conservation and income generation through sustainable resource management are mutually supportive activities (Jamal et al., 2006).

Using a qualitative methodology, the primary data of this research were collected conducting semi-structured and un-structured interviews with forest officials, tourist guides, representatives of the community-based organizations and local and foreign tourists who visit Kanneliya rainforest. Participatory rural appraisal (PRA) was used to collect information from the communities live in the Kanneliya forest periphery. Observations done in the forest contributed in triangulating the data and information.

The research findings suggest that although the authorities have identified and introduced certain tourism practices in the Kanneliya rainforest under the name of ecotourism, such practices do not embody at least the basics of ecotourism definition. The responsible authorities do not have the knowledge to identify or promote ecotourism and hence, their activities have led to certain discouragements of tourism promotion. Some of the community members received government funding to provide homestay facilities for tourists and there is an established community tourist guide service whilst they do not have the knowledge to manage sustainable ecotourism experiences. However, the communities in the Kanneliya forest periphery have an interest and a potential to involve in tourism. The existing ecotourism practices introduced by the authorities have neglected such communities and their potentials.

Some of the ecotourism development decisions implemented by the responsible authorities have led to the destruction of the natural environment and become a threat to biodiversity. Such decisions have linked with corrupted officials and misadministration of foreign funds. The uncontrolled, mismanaged and indecent ecotourism practices have resulted in bio-piracy, wildlife crimes, drug dealing and illegal alcohol businesses. Extensive numbers of tourists, unplanned and unwanted constructions in the forest under foreign-funded and government-led mega projects, lack of waste management, and water pollution have resulted in rapid environmental degradation.

The findings further suggest that without promoting sustainable environmental conservation practices, the sustainability of ecotourism management would not be a reality. Formulation and implementation of an integrated policy approach, encouraging collaboration between government and non-government sectors and communities has a potential to benefit communities in the Kanneliya forest periphery and contribute in sustainable ecotourism management and conservation.

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# 101 Exploring the association of trip characteristics and motivations with pro-environmental outcomes of Antarctic tourists: An analysis based on PRE and POST surveys.

**Daniela Cajiao[1,2], Yu-Fai Leung[3], Lincoln Larson[3], Pablo Tejedo[1], Javier Benayas[1,4]**, [1]Departamento de Ecología, Universidad Autónoma de Madrid, Spain. [2]Instituto de Ecología Aplicada, Universidad San Francisco de Quito, Ecuador. [3]Department of Parks, Recreation & Tourism Management, North Carolina State University, USA. [4]Centro de Investigación en Biodiversidad y Cambio Global, Spain

Tourism in Antarctica has significantly increased and diversified over the last decades (Carey, 2020). In the 2019-2020 season, the International Association of Antarctica Tour Operators (IAATO) reported 74 401 tourists visiting the continent, representing a 134% increase from the 2010-2011 season (IAATO, 2021). While Antarctic tourists are purported to have meaningful interactions with the Antarctic environment, little empirical research exists to understand how motivations and trip characteristics of the Antarctic journey shape tourists' experiential outputs, which may in turn influence their pro-environmental outcomes, both core elements of Nature Based Tourism (NBT) experiences.

Powell et al. (2009, 2012) adapted the interactional model to NBT experiences as a lens to explore the effects of the Antarctic experience. The authors suggested that the interactive exchange between tourists' characteristics and their physical and social environment could influence their experiential outcomes. Based on this, we proposed a new model (Fig. 1) in which we conceptualized perceived importance of trip characteristics (PITC) and tourist motivations as key inputs. Different from the literature, we differentiated experiential outputs and pro-environmental outcomes. Specifically, satisfaction, perceived learning (PL) and measured learning (ML) were considered experiential outputs with potential influences on pro-environmental outcomes, which constituted environmental concerns (EC), management preferences (MP), and behavior intentions (BI).

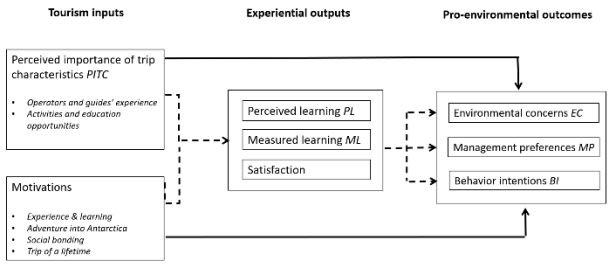


*Figure 1: A conceptual model showing the potential relationship between tourism inputs, experiential outputs, and their influence on pro-environmental outcomes.*

This presentation reports results from a larger ongoing study in which we are examining different parts of the conceptual model. Here we focus on one research question: How are the differences in trip characteristics and motivations associated with experiential outputs and pro-environmental outcomes of Antarctic tourists? To examine these relationships, we conducted exploratory analyses using 242 pre-and post-trip surveys collected during the 2019- 2020 Antarctic season. First, we applied

Spearman correlations to determine the association among PITC variables, experiential outputs (ML, PL, satisfaction), and pro-environmental outcomes (EC, MP, BI). We applied a two-step clustering procedure to identify a typology of tourists reflecting their travel motivations. We also applied Kruskal-Wallis tests to compare Antarctic motivation groups on their respective associations with experiential outputs and pro-environmental outcomes.

Our Spearman correlations showed highly significant associations of PITC variable activities and education opportunities with both PL ($\rho$ (240) =.38, p<.0001) and satisfaction variables ($\rho$ (240) =.26, p<.0001). PITC variable operator and guides' experience was also significantly correlated with PL ($\rho$ (240) =.12, p<.043) and satisfaction ($\rho$ (240) =.19, p<.002). Regarding the pro-environmental outcomes, the PITC variable activities and education opportunities was significantly correlated with the

BI dimensions of policy support (ρ (240) =.15, p<.015), financial support (ρ (240) =.17, p<.005), and the variable MP (ρ (240) =.12, p<.048). While the variable operator and guides' experience was significantly correlated with the same BI dimensions policy support (ρ (240) =.13, p<.053) and financial support (ρ (240) =.12, p<.044) and the variable sharing information (ρ (240) =.13, p<.037)

Results of our cluster analysis revealed a four-group typology of Antarctic tourists: 1. Experiencing & learning, 2. Social bonding, 3. Adventure into Antarctica, 4. Trip of a lifetime. Only two significant correlations were identified between these motivation groups with the output or outcome variables. Kruskal-Wallis tests revealed significant differences in means for PL (H (3) = 7.53, p=.056), with the trip of a lifetime group reporting the highest levels of PL (M=8.66), significantly higher than the social bonding group (p=.053). ML outcomes were also different (H (3) = 6.67, p=.082), with the experience & learning group (M=0.13) reporting the highest overall mean, significantly higher than the adventure group (p=.082). None of the pro-environmental outcomes showed a significant direct association with any motivation groups.

Our results exhibit similarities with past studies on NBT experiences (Beh & Bruyere, 2007, Miller et al., 2020 Ardoin et al., 2015, Ballantyne et al., 2012), which demonstrate the importance of satisfaction and learning in facilitating pro-environmental outcomes. We confirmed that specific inputs of motivations and PITC influenced experiential outputs differently, especially PL and satisfaction, which were in turn strongly associated with pro-environmental outcomes. Our findings reinforce the importance of creating meaningful and transformative Antarctic experiences for tourists who are traveling with a diversity of motivations and expectations if pro-environmental outcomes are to be achieved. We also emphasize the essential role of Antarctic tour operators in creating and tailoring communication and educational strategies for their diverse guests-two essential components of NBT experiences and critical elements for the evolving Antarctic tourism.

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## 100 The second home industry in Norway - management and sustainability

**Hogne Øian**[1], **Birgitta Ericsson**[2], **Sofie Selvaag**[1], **Monica Breiby**[2], **Merethe Lerfald**[3], [1]Norwegian Institute for Nature Research, Norway. [2]Inland Norway University of Applied Sciences, Norway. [3]Inland Norway University of Applied Sciences Search, Norway

Norway, like the other Nordic countries, has long holiday-cabin traditions (see e.g. Müller, 2007). Until a few decades ago cabins were built scattered throughout large mountainous areas and were mostly without electricity, water supply, and car road connection. Since the 80s, urbanization, growing average income, increased mobility, flexible working hours, and digitalization have caused an increasing demand for second homes with a standard that roughly equals first homes. This has changed both the landscapes and the ways in which people are using their second homes.

The increase in the number of second homes should also be seen in the context of the continuous depopulation of Norway's mountain municipalities. The growing tourism industry is often viewed as the lifeline in these communities. This has contributed significantly to the boom in second home industry, especially in areas easily accessible from the metropolitan areas. While offering economic advantages for landowners and developers, local businesses, and municipalities, the second home industry encounters several sustainability challenges, which has resulted in resentments and conflicts among several kinds of stakeholders (Overvåg & Berg, 2011).

This paper is based on a study of sustainability issues that has emerged in the wake of the recent second home developments in the popular mountainous area of Sjusjøen (south-eastern Norway). Sjusjøen makes a prominent example of developments characterised by a sharp increase in densely built high standard second homes (both detached houses and apartments) that have occurred several places in Norway. Based on interviews with key stakeholders and documents studies (including newspapers and social media), the overarching aim of the study has been to explore various social effects of the expansive second home development and how diverse stakeholders relate to sustainability issues.

The new second homes are built in dense clusters below the timberline. Several benefits are associated with this policy. The development of infrastructures becomes more efficient, less land areas are seized, and the ecologically vulnerable mountain area above the timberline is spared.

Despite the advantages of the densification policy, several voices are maintaining that the current development is unsustainable and must be halted. Owners of the existing, less-exclusive second homes that were constructed some decades ago, as well as local outdoor recreationists, express their concerns about the deterioration of the landscape caused by the buildings and the extensive infrastructures (Breiby et al., 2021). It is maintained that what is perceived as an authentic landscape is transformed into something that is experienced as incompatible with their own preferred ways of engaging with the surrounding nature, the landscape, and the place. Furthermore, it is argued that neither landowners nor the municipality takes peoples' concerns into consideration (Breiby et al., 2021). In news reports and op-eds in the national and regional media, Sjusjøen is referred to as an example of how the second home industry is part of a larger process of unsustainable use of nature, such as growing areas of spur plantations, constructions of high-ways through protected areas, the construction windmill parks.

Tourism development is becoming increasingly subject to policymaking, legislation, and regulation (Ruhanen, 2013). Despite this, public authorities continue to see tourism primarily as a tool for economic growth and employment. Holistic long-term coordination and planning are often inadequate, relevant stakeholders of both public and private sectors tend to be left out of these processes, and governments rarely take a leading role in securing environmental and social sustainability (Hall, 2015; Overvåg & Berg, 2011). One unfortunate effect with respect to the second home industry is that owners of second homes tend to become an invisible population for local authorities. Consequently, infrastructures and public services are rarely dimensioned in accordance with the actual number of people using them

(Paris, 2014: Overvåg & Berg, 2011). While this represents challenges for the municipalities and its inhabitants, it also raises the issue of the political rights of the owners of second home as part-time residents (Åkerlund et al., 2015)

Due to the high standard, the growing mobility, and the multi-residential practices (Ellingsen, 2017), second homes in Sjusjøen are visited all year round, during oval weekends and holidays, but even in the midweek (Ericsson & Flogenfeldt, 2018). During the pandemic, second homes have increasingly been taken into use as peoples' home office. Thus, the pandemic may contribute to further increase in both frequency and length of the stay. It that case, the distinction between the two categories of homes will become even more blurred, and the function of the second homes even more equivalent to those of the first home.

Furthermore, it's likely that this will strengthen the attachment to and sense of the place where their second home is located (see Kaltenborn et al., 2009). This may influence their sustainability concerns considerably (Brehm et al., 2011). Hence, as part-time residents second home owners can be inclined, in the same manner as local recreationist, to engage with the landscapes in ways that make them think of land properties as public goods rather as economic resources for the landowners and the local communities (see Øian & Skogen, 2016).

With respect to the current second home developments in Norway, we will explore in what ways several conflicts of interests arise from the relative irreconcilability of perceiving the landscape as an economic resource on the one hand and on the other hand the landscape as an asset for recreation in nature, and how this has ramifications for in what ways sustainability issues are viewed by stakeholders with differing interests.

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# 136 A participatory assessment of the USDA Forest Service Southwestern Region's sustainable recreation strategy

**Steven Selin**[1], **Francisco Valenzuela**[2], **Jeremy Golston**[3], [1]West Virginia University, USA. [2]Retired Forest Service, USA. [3]USDA Forest Service, USA

Public land management agencies, both in the United States and internationally, have been challenged mightily to operationalize sustainable outdoor recreation and nature-based tourism policies and practices at a field level. Needed are action-oriented and field-based evaluative research focused on "how" sustainable recreation is being operationalized in the field. The purpose of this research study was to conduct a participatory evaluation of the Southwestern Region (Region 3) Sustainable Recreation Strategy (SRS) after five years of implementation. Using both outcome-based and process measures, the study evaluated the efficacy of SRS policy/program actions and interventions in progressing towards its original goals and expected outcomes. In addition, the study also assessed what policy/program adjustments are needed in the SRS to adapt to system and agency change and to strengthen the capacity of Region 3 Recreation Programs across the 11 National Forests.

Participatory evaluation is a partnership approach to program evaluation where stakeholders actively engage in developing the evaluation and in all phases of its implementation (Zukoski and Luluquisin, 2002). This makes intuitive sense. Those who have the most at stake in the program—staff, partners, beneficiaries, funders, and key decision-makers—should play active roles. Used extensively in the philanthropy and nonprofit sector as an assessment tool, participatory evaluation differs from more traditional evaluation models in it's participant focus and ownership of the evaluation process, broad range of stakeholders participating, focus on learning, and flexible design (USAID, 2011). With participatory evaluation, the process of evaluation is as important as the outcomes of evaluation. A participatory evaluation process can promote participant learning about the program and expand their understanding of other stakeholder perspectives. It can improve participant evaluation competencies, and can mobilize participant sense of teamwork and shared commitment to a common cause.

This research study also focused squarely on the topic of how institutions are mobilizing to operationalize sustainability in their operations and programs. Integrating sustainability concepts, tools, and best practices across the outdoor recreation and park profession has gained momentum over the past three decades (Manning et al., 2011; McCool & Moisey, 2001; Selin, 2017). This is also true in the forest recreation area where the concept of "sustainable recreation" has gained prominence as an integrative framework (Selin, 2017). For example, for the past ten years, the Forest Service has worked to operationalize their Framework for Sustainable Recreation (USDA Forest Service, 2010) which emphasizes "reconnecting" the American public with their National Forests and inspiring citizen responsibility to take care of it. This research study analyzes how one Forest Service Region (Region 3) has worked to operationalize sustainability through their Sustainable Recreation Strategy over the past five years. How one Forest Service Region has worked to operationalize sustainability is analyzed through the methodological lens of a participatory evaluation study of their Sustainable Recreation Strategy after five years of implementation.

Following this approach, the study incorporated multiple data sources into the participatory evaluation including: annual SRS Performance and Accomplishment Measures Reports, a literature review of previous research and evaluation studies from Region 3, and a telephone interview of 38 Region 3 SRS stakeholders. These telephone interviews followed a carefully scripted interview schedule with some open-ended, qualitative questions and some close-ended, quantitative questions. Telephone interviews were transcribed into WORD documents and then analyzed using NVIVO 12 qualitative analysis software.

Final results from the research study will be presented at the MMV 2021 conference. Results from the Sustainable Recreation Strategy (SRS) stakeholder survey provided decision-makers with

useful input about the overall effectiveness and future direction of the SRS. Stakeholders felt that the SRS, as a broad regional strategy, has been a positive force across the Southwestern Region. Stakeholders felt that, after five years, progress had been made towards the Leadership, Partnership, and Action Plan Critical Success Factors identified when the SRS was initiated in 2014 and more generally on a more positive organizational culture and employee morale across Region 3. This is especially meaningful at a time when, nationally, Forest Service employee morale has been reported to be on the decline (Marsh, 2018).

Contrary to these positive comments, some respondents suggested that the SRS maybe losing some management focus and it may be time, as a Region, to update and revise the Strategy so it continues to generate significant benefits across the Region.

Stakeholders also identified both internal and external constraints to achieving sustainable recreation goals across the Region. While a number of constraints are identified in the results section, challenges associated with the reorganized Grants & Agreements protocols attracted the most comments along with sentiment about a loss of management and leadership focus on the SRS as a result of competing priorities like the fuel reduction flagship targets being implemented across the Agency.

Results from the stakeholder survey also provide useful input into the future trajectory of the SRS. Stakeholders surveyed expressed strong support for the continuation and strengthening of the SRS. In addition, stakeholders provided input into how the SRS should be updated, making many programmatic recommendations to inform decision-makers. Common themes raised here included updating broad SRS goals and implementation strategies, focus Regional Office support on helping local units implement their Forest Action Plans, and strengthening continuous communication strategies between Forest Service units and externally with stakeholders, volunteers, and partners.

Results from this participatory evaluation of the SRS can provide meaningful feedback to other public land management agencies, both in the United States and internationally, about how to effectively operationalize sustainable recreation at the field level. These results also support the continued use of participatory evaluation methods to strengthen more adaptive and collaborative approaches to the design, planning, and implementation of sustainable recreation policies and practices.

# 137 Impacts and trade-offs of alternative transportation systems in U.S. National Parks

**Bettina Spernbauer**[1,2], **Chris Monz**[1,2], **Jordan Smith**[1,2], [1]Institute of Outdoor Recreation and Tourism, Utah State University, USA. [2]Department of Environment and Society, Utah State University, USA

## Introduction

As climate change continues to become a serious threat to social and ecological systems, strategies to reduce emissions are becoming increasingly important. Many park and protected area management agencies have begun to seriously consider their role in contributing to, and possibly mitigating, climate change. The US National Park Service, for example, has attempted to reduce the emissions generated as a result of park visitation by implementing alternative transportation systems (ATS) at select national parks across the country. Those most commonly include voluntary or mandatory shuttle systems. Despite their promise of reducing emissions while also alleviating congestion and capacity issues, the implementation of ATS can have other consequences such as negatively affecting visitor experiences, resource conditions at attraction sites, and park budgets (Lawson et al., 2017; Manning et al., 2014). National park managers are consequently placed in the precarious position of having to consider the visitor experience, resource protection, and economic development (National Park Service, 2004). Balancing trade-offs between environmental, social, and economic interests is made more difficult given the lack of research which has taken a comprehensive approach to the implications of ATS. This research begins to fill this gap by systematically examining the primary and secondary impacts of ATS in US National Parks. By doing so, we provide managers and researchers with a holistic view on the topic, and point out the trade-offs that need to be considered when considering implementing or expanding an ATS.

## Methods

We conducted an integrative literature review to explore previous literature on the topic, with the goal of developing a synthesis of impacts of ATS in park and protected areas. The assumption that ATS have impacts on environmental, social, and economic dimensions (Litman, 2007; Orsi, 2015) served as the main conceptual structure. Accepted practices for conducting an integrative review (i.e., identification, analysis, and synthesis of the literature) served as the methodological structure (Torraco, 2005).

Our investigation of the literature used key word strings to search the online databases Scopus, ProQuest, the National Park Service IRMA Portal, and the US Department of Transportation's Volpe Center's publication page. The search was conducted in November and December 2020. Publications that met defined inclusion criteria were analyzed and a list of characteristics (impacts) was then developed to provide a holistic picture on the known impacts of ATS, as measured in previous literature. Several articles addressed more than one characteristic and were therefore included into more than one dimension that framed our analysis.

*Table 1: Characteristics impacted by ATS and their potential secondary consequences*

| ATS | Characteristic | Environmental | Social | Economic |
|---|---|---|---|---|
| **Environmental** | | | | |
| + | Emissions | x | x | x |
| +/- | Noise | x | x | x |
| + | Wildlife Disturbance | x | x | x |
| **Social** | | | | |
| +/- | Visitor Experience | x | x | x |
| + | Nature Experience | x | x | x |
| + | Education/Interpretation | x | x | x |
| +/- | Visitor Diversity | | x | x |
| + | Congestion/Traffic | x | x | x |
| +/- | Safety | | x | x |
| | Crowding | x | x | x |
| - | Bus | | | |
| +/- | Site | | | |
| +/- | Trail | | | |
| | Parking | x | x | x |
| + | Trailhead/Attraction | | | |
| - | P&R | | | |
| +/- | Communities | | | |
| **Economic** | | | | |
| +/- | Business Revenue/Visitor Spending | | x | x |
| + | Local Employment & Commuting | x | x | x |
| +/- | User Fees | | x | x |
| + | Partnerships | x | x | x |
| - | Capital Expenditure & Operating Cost | | | x |

## Results

A total of 46 peer-reviewed articles, management plans, case studies, technical reports, and operational evaluations, were included into the analysis. Our analysis generated detailed descriptions of documented impacts, how those impacts were measured, possible secondary consequences, and identified knowledge gaps. We found 16 individual documented impacts which varied in their directionality (positive, negative, neutral/inconclusive). These impacts are listed in Table 1. A total of 36 publications addressed social impacts, with the visitor experience being by far the most studied (n = 35) followed by congestion/traffic (n = 15), nature experience (n = 12), and capital expenditure and operating cost. Environmental and economic impacts were addressed by 10 and 23 publications respectively, with emissions (n = 6) as well as capital expenditure and operating cost (n = 12) most commonly being measured in those dimensions. We found the extent to which impacts of ATS were measured varied greatly, as did the extent to which secondary consequences of documented impacts were quantified or even discussed. Nearly all of the impacts we identified had at least one secondary consequence, with most having several. These secondary consequences are shown on the right side of Table 1.

Our analysis also highlighted several knowledge gaps, as for example, the impact of ATS on visitation.

Collectively, the analysis of documented impacts, secondary consequences, and knowledge gaps provides a framework through which managers can better understand the full scope of trade-offs between the environmental, economic, and social characteristics of their parks. "

**Discussion**

As park managers in the U.S. continue to grapple with rising visitation and rising temperatures, the analysis presented here provides a full state-of-the-science review to guide future management decisions. Results clearly demonstrate the complexity of the issue, and identify unique trade-offs that have to be considered in management decisions regarding the implementation of ATS. Impacts are not uniformly positive and ATS can potentially cause unforeseen consequences. Our analysis highlights the fact that impacts are highly interconnected with each other and can have further implications that may not be obvious at the first glance. It also identifies research gaps that need to be addressed in a more concerted way in the future. Doing so will help provide the science needed for park managers to make more informed decisions regarding the implementation or expansion of ATS.

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# 56 Managing sustainable development in recreational and protected areas

**Monica A. Breiby[1]**, **Sofie Kjendlie Selvaag[2]**, **Hogne Øian[2]**, **Eva Duedahl[3]**, **Merethe Lerfald[1]**, [1]Inland Norway University of Applied Sciences, Norway. [2]Norwegian Institute for Nature Research, Norway. [3]Inland Norway University of Applied Sciences, Norway

In the process of developing local visitor strategies for the Norwegian Protected Areas within 2020, the intention is to facilitate for better visitor experiences and improve local economies related to tourism, without affecting the conservation values (Norwegian Environment Agency, 2015). Hence, protected areas have become more closely connected to their economic and social environments, with an emphasis on integrating national parks into wider regional and local tourism development processes (e.g., Hidle, 2019; Puhakka & Saarinen, 2013).

This case study involves a mountain municipality with two of the largest national parks in Norway, Dovrefjell-Sunndalsfjella and Rondane-Dovre. More than 73% of the municipality`s area has protection status. As protection regulations restrict tourism development within the borders of the park, the governmental policy is to encourage tourism development in the edge zones. However, recently the government has asked each national park to develop individual visitor strategies in order to allow for extended tourism activities within the borders of the national park. Tourism development is welcomed in mountain communities that experiences depopulation and shrinking job opportunities. Local inhabitants do on the one hand resent the protections regulations as it put restriction on how the protected areas were used traditionally, and on the other hand they are concerned that increased tourism inside the park will prioritize the needs of visitors more than of the local inhabitants.

In other words, measures taken to achieve ecological sustainability are not necessarily consistent with what is perceived as the most acceptable solutions for reaching social or economic sustainability. Tourism destinations present complex governance contexts because of the multiple, and often competing, stakeholder groups involved in producing and delivering tourism products (Islam et al., 2018). Despite new trends and political intentions toward more collaboration, conflicts between local authorities and the state government continue in rural areas (Overvåg et al., 2015b). The main aim of this study is to explore how key stakeholders, with their different interests at stake, identify dilemmas, challenges and opportunities in a national park, and to suggest if the various opinions can be integrated in an adaptive management framework for sustainable development. The inclusion of ongoing discourses in the management process may open gateways to innovative thinking of sustainability goals as opportunities for unifying current tourism development and the preservation of the nature for future generations (Carayannis et al., 2012).

Tourism scholars use complex adaptive cycles for understanding how complex systems of ongoing transitions can play out (Baggio & Sainaghi, 2011). For example, a tourism destination is an open and flexible system characterized by a high degree of interaction between firms providing tourist services, residents of destinations, local authorities and tourists. Adaptive management strategies are held to be appropriate in contexts characterized by uncertainty, and where governance processes are unable to establish agency and collaborative actions (Baird et al., 2016). In a national park context, the adaptive management strategies can be seen in light of the community-based tradition. This tradition involves the social and political dimensions of sustainability that makes negotiations and participation of a variety of local stakeholders possible, and takes how the host communities can benefit from tourism into account (Saarinen, 2014).

Two focus group interviews, supported with a number of individual interviews, were conducted with private and public key stakeholders. In order to accomplish a broad understanding of the dilemmas, conflicts and opportunities in the protected areas, the interview sample included public national parks stakeholders at both local, regional and national level and enterprises of the tourism industry. The study is part of a larger industry-oriented research project in South Eastern Norway. Semi-structured

interview guides were used and the focus group interviews were taped and then fully transcribed.

The main results from the interviews with key stakeholders reveal three components of the adaptive management framework. Firstly, 'combining a bottom-up/top-down strategy in protected areas' is highly relevant to strengthen and integrate stakeholders' perspectives to wider regional development processes. Several local stakeholders were worried about future tourism development given the power of the national protected areas authorities. This approach provides opportunities to examine social issues from different perspectives and build alliances on shared conservation values, thereby improving collaboration between governments, local authorities, and residents. Secondly, 'Channeling different user groups in protected areas' may help national park management maintain and enhance conservation values in line with visitor strategies through activity-based management approaches and soft management techniques, (e.g., applying zoning to achieve differentiated use, trail management, offering more guided tours). This approach supports the facilitating for better visitor experiences without affecting the conservation values in the national parks, e.g. the wild mountain reindeer.

Finally, the adaptive management approach 'The dynamics between protected and surrounding areas' was recognized in the material. The tourism suppliers can develop and offer attractive and modern outdoor recreation activities (e.g. cycling, snow experiences) and focus on user groups all year to increase the local value creation. This approach provides inspiration for new product (guided tours/new technology/packages) development, new and exciting stories to tell, and enhanced understanding of place knowledge in these outdoor areas. Hence, if reflected in the national policies and governance (e.g., in the visitor strategies for the national parks), this component can contribute to create more attractive environments for economic development.

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# Mapping and documenting coastal-marine based recreation

| SESSION | PART | DATE | TIME | CHAIRS |
|---|---|---|---|---|
| 1D | I | Tuesday 17th August | 14.00 – 15.20 CET | Anton Stahl Olofsson & Andreas Skriver Hansen |
| 2D | II | Tuesday 17th August | 15.40 – 17.00 CET | Anton Stahl Olofsson |

| | Programme |
|---|---|
| *1D* | **10** Mapping recreational activities in coastal and marine areas – PPGIS findings from western Sweden |
| | **82** Mapping visitation across thousands of kilometres of beaches using social media data |
| | **142** Inclusion of coastal and marine recreation in a data-driven framework for ecosystem-based Maritime Spatial Planning in Danish marine waters. |
| | **83** Community usage, awareness and perceptions of marine parks and sanctuaries in Victoria, Australia. |
| *2D* | **114** Seascapes in the Azores: from tourist perception to site evaluation |
| | **160** Old fortification islands opened for visitors in Finland |
| | **164** Cold water wave surfing and tourism destination developments in Norway |
| | **19** Exploring landscape-scale social and ecological drivers of backcountry sea kayaker campsite selection in Glacier Bay National Park, Alaska, USA |
| | **71** Differences in the desired environments for marine and coastal recreational spots: an analysis of user valuation at travel- review websites |

# 10 Mapping recreational activities in coastal and marine areas – PPGIS findings from western Sweden

**Andreas Skriver Hansen**[1], **Vidar Glette**[2], **Javier Falla Arce**[3], [1]University of Gothenburg, Sweden. [2]Ramboll Consultants, Sweden. [3]Gothenburg Region, Sweden

The presentation reports on a study and published paper with a focus on mapping coastal-marine recreation in the Gothenburg region on the west coast of Sweden. In Sweden, outdoor recreation is considered an important land and water use activity, and is associated with key societal aspects, such as increased environmental awareness, public health and local development. For this reason, outdoor recreation has become an important planning topic in the Gothenburg region, which offers many recreational opportunities in the coastal zone (Hansen, 2016).

Lately, the topic has received increased attention, accelerated by two processes. The first process concerns current work on national maritime spatial planning in Sweden, wherein outdoor recreation is emphasized as a key spatial layer alongside tourism and cultural heritage. The second process is strongly influenced by the maritime planning process and concerns regional and local coastal-marine development initiatives. In Sweden, the municipalities have the planning responsibility for the coastal zone. Consequently, many coastal regions and municipalities, including Gothenburg region, currently work towards clarifying and structuring their coastal interests, including outdoor recreation, in order to synchronize with the national maritime plans.

As part of this process, The Gothenburg Region (GR), a co-operative organization for 13 municipalities located around Gothenburg, launched a project between 2016 and 2019 with an aim to achieve sustainable coastal-marine development in the region's coastal municipalities. In late 2019, the result of the project was presented as a structural plan for the coastal zone, with a particular focus on a range of conservation and development initiatives. An important part of the work included an analysis of existing planning material as well as identification of missing documentation of key land and water use categories. This work revealed that documentation of outdoor recreation in the region's coastal zone was almost completely missing. The situation presented a problem as an important prerequisite for planning, and thereby ensuring, quality recreational content in the coastal zone is detailed knowledge about it.

The study reported in the paper was formed in response to the situation. In practice, the study was done as a complementary study towards the end of the regional project with a focus on mapping recreational activities in the coastal zone. To move away from previous information sources, a choice was made to use a Public Participation GIS (PPGIS) method approach. PPGIS specializes in collecting relevant geographic data that can be used for mapping and overview purposes and is therefore particularly useful in planning processes. Furthermore, a distinct feature and difference from earlier sources is that PPGIS studies build on citizen science principles, involving members of the public in actively contributing with data input, leading to the generation of new data layers (Brown & Kyttä, 2014). The study therefore explored two key aspects: identifying and mapping coastal-marine recreation in order to create a basic knowledge base for planning processes in the region as well as introducing, testing and pioneering the PPGIS method approach in the region.

The most significant output of the study was spatial information about and, as a result, a basic knowledge base on coastal-marine outdoor recreation in the region. For the first time, it is possible to see the connection between the various recreational activities and the geographical context where they take place. For instance, the work shows that recreational activities take place almost everywhere along the coast and near coastal waters, confirming coastal-marine areas as a favorable recreational landscape type in the region. Furthermore, the work not only shows the presence, but also indications of volumes of coastal-based recreation in the region. An important result is also that there appears to be variation between locations of different recreational

activities, which is not a surprising result, but important to visualize nonetheless.

Together, the results confirm outdoor recreation as a significant land and water use category that deserves more attention and priority in future planning processes in the region. From a more regional perspective, the study results not only generate a new information layer to be used in regional planning processes, but also present an opportunity to work more actively with the region's focus on sustainable coastal development. On a national level, the study findings also have relevance in the work on maritime spatial planning. For instance, the study confirms outdoor recreation to be a mostly near coastal activity with limited impact on the national planning area. In other words, coastal-marine recreational is primarily a focus for municipal planning activities.

The work also concluded that the chosen PPGIS method strategy worked particularly well in terms of getting a spatial overview and involving citizens to take part of these types of studies. Indeed, from a research perspective, the work opens up for a broader look at data collection strategies that go beyond traditional visitor monitoring methodologies. Researchers with an interest in these types of studies must learn to embrace new technologies and what solutions they offer, while also being mindful about the pros and cons of applying the methods, including thoughts about the geographical context wherein they are applied.

The reported study findings demonstrate that coastal-marine outdoor recreation no longer can continue to be an overlooked or disregarded planning category in the region. However, efforts should not stop here. In fact, the true value of the findings will only become apparent if the work is continued, partly in order to create more certainty around the results and partly as a way to discuss future changes and identify new developments. To realize this, the study must reach municipal and regional planners, who are the real targets for the study results and who not only have the power, but also the biggest need, to continue the work. If this outreach can be achieved, and planners embrace both the study results and the method approach, it would be an important step towards building a comprehensive knowledge base on outdoor recreation in all parts of the region.

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# 82 Mapping visitation across thousands of kilometres of beaches using social media data

**Vanessa Teles da Mota**, **Catherine Pickering**, Griffith University, Australia

## Introduction

Coastal areas are very popular worldwide, providing a range of important ecosystem services. Tourism and recreation are within those services, with beach tourism popular in a range of areas including the Mediterranean, east and west coast of the USA, Latin America and Australia. Assessing tourists to beaches including who visits, when and where and what they value is important for tourism and coastal managers, including to better allocate facilities and resources and for tourism campaigns. Traditional methods such as direct observations, track counters, and surveys have been used to gather such data, but with some limitations (Veal, 2018). In an attempt to complement traditional methods, metadata of posts on social media platforms have been increasingly used by researchers to assess visitation to natural areas (Ghermandi & Sinclair, 2019; Teles da Mota & Pickering, 2020), as it is often free and easy to use, and provide large amounts of user generated content. Beaches, although very popular for tourism, are only now being assessed using geolocated data from social media. This talk presents preliminary results of a comparison of temporal and spatial patterns of beach use at a regional scale, using Flickr images metadata. Specifically, it assesses: (1) who visits beaches, including locals, other nationals and international tourists, and (2) temporal and (3) spatial patterns of beach use along the whole 2,101 km coastline of New South Wales (NSW), Australia, including Sydney, the largest city in Australia with internationally renowned beaches including Bondi and Manly.

## Methods

Data was retrieved using the Flickr Application Programming Interface and the statistical program R Studio. Metadata were obtained from a larger dataset of images from the social media platform Flickr posted between 2010 and 2019, that used the words "beach" and "Australia" in the text, tags or descriptions of images. All the geolocated images within the coastline of NSW and where people disclosed their home location, were analysed. People and their images were allocated into three groups: locals, consisting of people on Flickr indicating they were from NSW, Australian tourists (those from other areas in Australia), and international tourists which were any people based in other countries.

Temporal patterns in beach visitation were assessed including weekly and monthly distribution of images. This was done for images capped per user per weekday (PUW) and per month (PUM), selecting the image with the largest number of views per user, per time period. The resulting temporal data of visitation were then compared between locals, Australians and international tourists using Chi-squared tests.

To assess spatial patterns of use, the images' geolocation was used to create shapefiles in QGIS software using a grid of 20 $km^2$ grid cells to calculate hotspots of use using a plugin that calculates the Getis-Ord Gi* local statistic. This was done for images capped per user per day (PUD), a proxy for visitation data, and the results compared between locals, other Australians and international tourists.

## Results

There were 1,070 people posting 11,057 images from beaches in NSW, of which 47% were posted by locals, 18% by other Australians and 35% by international tourists. This represented over 3,000 visits to beaches based on the PUD data (Figure 1), with more people from other countries posting images (48% users), but locals visiting beaches more often (Chi-square, $p<0.001$). Other Australians were mainly from Queensland (north) and Victoria (26%) (south of NSW), while international tourists where mostly from Europe (44%), North America (30%) and Asia (15%). There were clear differences in when locals and tourists visited the beaches in NSW. Weekends were preferred by locals and other Australians (Chi-square, $p<0.001$), whereas international tourists were equally likely to visit any day of the week. For monthly patterns, locals visited beaches all year round, for other Australians it was mainly summer

(December to February) or August, while for internationals it was between November and May (Chi-square, p<0.001). Spatial patterns revealed some interesting patterns, with Sydney beaches hotspots for all three groups, but other Australians also liked beaches close to the border with Queensland in the north.

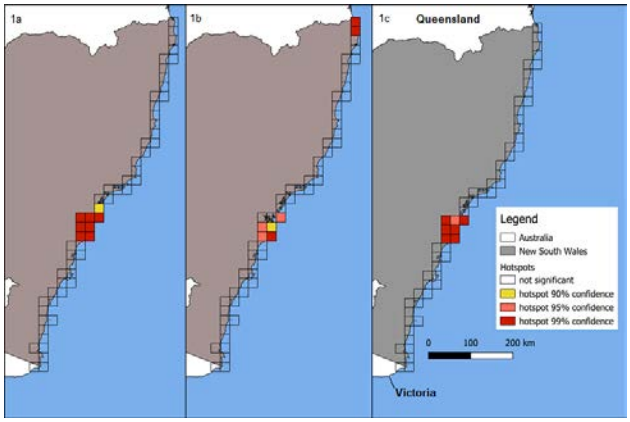


*Figure 1 – Distribution of 3,101 images taken on beaches in NSW, Australia, including 1,728 images posted by locals (1a), 440 images from other Australians (1b) and 933 images from International visitors (1c). Data consists of Photo-user-Days (PUD) of images on Flickr from 2010-2019 that included the words "beaches" and "Australia" and were geolocated along the coastline.*

**Discussion**

Beaches in Australia including in NSW are popular including for locals, other Australians and international tourists. Results based on Flickr images show the typical temporal patterns of visitation, including locals visiting beaches more frequently reflecting easy access and the popularity of these areas for recreation. Visits were more frequent during the weekends for locals and Australian tourists, while for international tourists any day of the week was popular potentially reflecting their medium/ long-term holidays in Australia. Beaches were popular year-round for locals, while for Australian tourists it often coincide with school holidays. International tourists visited beaches over a longer period, including during winter and spring in Europe and North America, but summer and autumn in Australia. Spatial patterns revealed that Sydney was the main hotspot for all groups, but other Australians mainly from neighbouring states, also found northern NSW including around the famous beaches of Byron Bay popular.

Metadata from Flickr images can provide important insights into who and when people visit beaches at regional scales assisting tourism and coastal managers as a complementary source of data. However, there are important limitations to the data including low numbers of beach visitors using social media including Flickr, a lack of representation in who uses them, issues with identifying relevant data/images and ensuring ethical and privacy issues are taken into account.

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## 142 Inclusion of coastal and marine recreation in a data-driven framework for ecosystem-based Maritime Spatial Planning in Danish marine waters.

**Berit Charlotte Kaae**, **Anton S. Olafsson**, University of Copenhagen, Denmark

This presentation describes how coastal and marine recreation data has been included in a cross-sectoral project 'ECOMAR: A data-driven framework for ecosystem-based Maritime Spatial Planning in Danish marine waters'. This development and demonstration project involves data from a range of marine sectors including coastal and marine recreation and analyses these in an extensive cumulative impact assessment modelling. The presentation will focus on the results linked to the coastal and marine recreation: How other marine sectors have impact on coastal and marine recreation as well as the recreational impacts on some of the sectors. The results, implications and use of coastal and marine recreation data for Maritime Spatial Planning and management are discussed and related to the newly released Danish Maritime Spatial Plan.

The data on coastal and marine recreation was collected through two studies: A crowdsource-based study using an online PPGIS mapping tool allowing respondents to map places of marine recreation and identify key facts about their activity and the site. Secondly, this mapping tool was used in combination with a national representative survey of the Danish adult population with 10,291 valid responses. These studies provide new and more in-depth knowledge of 92 water-oriented recreation activities grouped in 16 main types as well as nationwide spatial mapping. In total approx. 16,000 recreation sites were mapped and the two studies supplement each other. Results show that marine recreation is very widespread and 77.6 percent of the adult population has participated in water-oriented recreation within the past year. Domestic tourism counts for 25 % of the mapped activities. Furthermore, our data was triangulated with AIS data on recreational boating and provides a solid documentation and mapping of coastal and marine recreation at national level.

### Link to project reports

Andersen, J.H., J. Bendtsen, K. Hammer, E.T. Harvey, S.W. Knudsen, C. Murray, J. Carstensen, I.K. Petersen, J. Tougaard, S. Sveegaard, K. Edelvang, J. Egekvist, J. Olsen, M. Vinther, Z. Al-Hamdani, J.B. Jensen, J.O. Leth, B.C. Kaae, A.S. Olafsson, W. McClintock, C. Burt & D. Yocum (2020): A data-driven framework for ecosystem-based Maritime Spatial Planning in Danish marine waters. Part I: Results and conclusions from a development and demonstration project. NIVA Denmark Report, 85 pp. Link: https://www.researchgate.net/publication/346975311_ECOMAR_A_data-driven_framework_for_ecosystem-based_Maritime_Spatial_Planning_in_Danish_marine_waters
Andersen, Jesper Harbo; Hammer, Kathrine Jul; Harvey, E. Therese; Knudsen, Steen Wilhelm; Murray, Ciaran Joseph; Carstensen, Jacob; Petersen, Ib Krag; Sveegaard, Signe; Tougaard, Jakob; Edelvang, Karen; Olsen, Jeppe; Vinther, Morten; Al-Hamdani, Zyad; Jensen, Jørn Bo; Leth, Jørgen O; Kaae, Berit C; Olafsson, Anton S. (2020) Supplementary material to ECOMAR: A data-driven framework for ecosystembased Maritime Spatial Planning in Danish marine waters. NIVA-rapport nr. 7525. Norsk institutt for vannforskning, 289 pp. Link: https://niva.brage.unit.no/niva-xmlui/handle/11250/2678968.

# 83 Community usage, awareness and perceptions of marine parks and sanctuaries in Victoria, Australia.

**Kelly de Bie**, **Michelle Rose**, Parks Victoria, Australia

National parks and protected areas in Victoria, Australia, are managed by a state government agency, Parks Victoria. Parks Victoria was established in 1998 and are responsible for managing an expanding and diverse estate covering more than 4 million hectares, or about 17 per cent, of the state. In 2002, the Victorian Government established the Marine National Park system, including 13 Marine National Parks (MPAs) and 11 Marine Sanctuaries. MPAs span Victoria's five marine bioregions and aim to conserve and protect ecological processes, habitats and associated flora and fauna.

With 2022 signalling the 20-year anniversary of the Victorian Marine National Park system, there was a desire to better understand Victorian's current awareness, usage and perceptions of marine parks and sanctuaries. Specific aims of this research include to:

- Measure recent community visitation to the MNPS
- Understand community awareness of, and key perceived benefits of the MNPS
- Identify differences in perceptions, if any, between users, non-users and their respective segments
- Identify indicators and metrics that could measure the social, ecological and/or economic value provided by the MNPS
- Understand awareness and reception of current communication tools, and identify avenues to develop and refine communications in general

We used a mixed method approach to data collection. This included a representative, online survey with the Victorian population aged over 18. Respondents were randomly selected from a permission-based panel with a total sample of n=1,009 surveys. We conducted segmentation analysis on the online sample data. An A-Priori approach was used based on the following variables, visitation frequency, attitudes to marine environment conservation, perceived impact of marine national parks and attitudes to governance of marine national parks. The resulting segmentation model included four visitor segments and three non- visitor segments. We also conducted qualitative, semi structured interviews. A series n=15 in-depth interviews were completed across two target visitor segments and one non- visitor segment.

Results show that 66% of Victorians are aware of the Marine National Park system. When prompted with a list of named marine parks and sanctuaries, awareness increases to 74%. Visitation was moderate with 34-43% of Victorians aged 18+ have visited a Marine National Park. There is uncertainty regarding which coastal/marine areas are part of the Marine National Park system, with just a third of visitors strongly agreeing that the boundaries of these marine parks or sanctuaries are clearly marked. Visitation over the last 12 months was low with visitation impacted by COVID restrictions. The majority of visitors made between one and five visits, with almost half saying they would visit more in a 'usual' year.

There is widespread community agreement that Victorian marine environments are under threat and should be protected (88%). While visitors do have higher levels of support for the Marine National Park system, even amongst non-visitors three quarters agree that more should be done to protect Victorian marine environments. Awareness of visitor impacts on marine parks is very low. Just half of Victorians believe that visitor activity poses a big/very big negative impact. Conversely, most are aware of the issues associated with marine plastics and litter, with 75% agreeing that this has a big/very big negative impact on the Marine National Park system. Despite the majority of visitors claiming adherence to onsite rules and regulations, just over two thirds are aware of the rules and regulations that apply within the boundaries of the marine park or sanctuary that they visit.

The benefits of marine parks are not well understood. Across 10 presented benefits, the impact rating ranges from 64% for 'protecting fragile areas of Victoria's coastline' to 45% for 'supporting

recreational or commercial fisheries'. Furthermore, only half of Victorians agree that marine parks and sanctuaries are successful in 'enabling young people and children to connect with nature' or 'improving people's wellbeing'.

Little is known about the governance of the Marine National Park system. Just 25% of the Victorian general population feel well informed about the planning and management of marine parks and sanctuaries. However, a sizeable proportion of the community (43%) would like to be more informed, with 10% strongly agreeing that they would like to know more.

The research provided seven segments ranging from disengaged non- visitors through to visitors who are advocates. These segments can be used to inform efforts to increase community recognition and stewardship of the Marine National Park system as they are based on engagement with marine parks and sanctuaries, and support for conservation and governance of Victorian marine environments.

Management implications from this research include the need to further raise the profile and awareness of the Marine National Park system among all Victorians. This is first and foremost about an information campaign to ensure all Victorians know the Marine National Park system exists and broadly its role and remit. This could be achieved through leveraging the broad community acceptance that the Victorian marine environment is at risk. There is a need to articulate the benefits of MPAs to visitors and the environment. There is potential to connect with Victorians through their concerns around marine plastics and litter and people's interest in animals. Families with children in local areas and schools are a target market, to build familiarity with, and respect, for marine environments, and to sow the seeds for a lifelong commitment to protection of the Marine National Park system. This group are more likely to donate time and money to marine sites or programs.

# 114 Seascapes in the Azores: from tourist perception to site evaluation

**Andrea Z. Botelho[1]**, **Ana C. Costa[2]**, **Manuela I. Parente[2]**, **Paulo Torres[2]**, **Paulo Borges[3]**, **João C. Nunes[3,4]**, **Maria A. Ventura[2]**, [1]CIBIO, Research Centre in Biodiversity and Genetic Resources - InBIO Associate Laboratory, Açores – Faculty of Sciences and Technology, University of the Azores, 9501-801 Ponta Delgada, Azores, Portugal. [2]CIBIO, Research Centre in Biodiversity and Genetic Resources - InBIO Associate Laboratory, Açores, Faculty of Sciences and Technology, University of the Azores, 9501-801 Ponta Delgada, Azores, Portugal. [3]Faculty of Sciences and Technology, University of the Azores, Rua Mãe de Deus, 9500-321 Ponta Delgada, Azores, Portugal. [4]Azores UNESCO Global Geopark, Rua do Pasteleiro, 9900-069 Horta, Açores, Portugal

**Introduction**

The Archipelago of the Azores has a high potential for tourism differentiation at an international level due to its distinctive and unique characteristics and natural beauty. Seascapes have high biological diversity, ecological and economic connectivity, and aesthetic and cultural value (Atkinson et al., 2011), although seldom subjected to assessments. Additionally, marine geological heritage has been only occasionally exploited by Azorean companies, mostly because there is a lack of data about underwater geodiversity, geological heritage, and its valuation, for recreational purposes. This study (within the project SCAPETOUR - SeaSCAPEs promotion to diversify TOURistic products) aimed to analyze visitors' perception regarding the importance of seascapes features and their value, more specifically: a detailed and full characterization as well as sectorial analyses of selected coastal and underwater trails for tourism and a valuation of seascapes for tourism and conservation purposes, including visitor's perception regarding the seascape features. In the context of species conservation and ecosystem protection, it is important to increase user's and stakeholders' knowledge on the natural value of the assets to promote sustainable use of the ocean and marine life.

**Methodology**

A methodology was developed based on scientific criteria following Rovere et al. (2011) and Flores-de la Hoya et al. (2018), namely those related to naturalness, adapted to Azores regional context. By including geological assets in the process, it is expected to enhance the geological relevance of local seascapes and to diversify the offer of new contents and products for existing or new underwater trails. A questionnaire and interview-based surveys were designed to assess the stakeholder's perceptions (scuba diving operators, tourists, and local users) regarding marine tourism, and their attributes, in particular on underwater seascapes. The development of the questionnaire for tourists was validated by the stakeholders (e.g., tourism operators). The survey was conducted by personal interviews with 258 tourists, from July to October 2019, in São Miguel Island, just after arrival onshore from a recreational diving activity. Before starting the questionnaire, respondents were provided with an introduction to the activity and gave consent to participate in the study. The questionnaire comprised three sections: demographics and diving level (certification and diving frequency); perception about the diving sites using an established set of criteria (e.g., biodiversity; geodiversity; seascape) to define each site; overall satisfaction about briefing and debriefing. Perceptions of respondents were subsequently rated, using a ten-point Likert scale, from the most negative (score 1) to the most positive (score 10).

**Main results**

Each diving site was analyzed based on a general score and on individual criteria, highlighting the features that are more valuable at each site (e.g., biodiversity – fish, invertebrates, macroalgae; geodiversity – arches, caves, other geological features). From the total questionnaires, 25 sites in São Miguel Island were mentioned by the tourists, and the top 10 diving sites were identified. Each site was analyzed based on a general score and on individual criteria, highlighting the features that are more valuable at each site (e.g., natural reef, vertical wall). Based on the observation of the values of the criteria, differences between sites were observed. It was also determined the priority criteria for the attribution of

the value of the seascapes by tourists. The preliminary results show that to evaluate a seascape, the geodiversity features are appreciated. The respondents' satisfaction level regarding the information provided during the briefings was mostly sufficient, except for the conservation aspects. More detailed information, about some subjects as invasive species / non-indigenous species, protected species, and protected areas, would be welcome by the respondents. Most were willing to answer the questionnaire and expressed satisfaction to be part of a citizen science activity and showed high interest in being involved in the protection of the environment (litter report, invasive species recording), and in marine litter cleaning actions. It was also frequently mentioned the need for effective protected measures (protected area, marine resource surveillance, fishing regulation).

Field data (e.g., biodiversity, geodiversity, human pressures, and impacts) provided information for on-going MSFD monitoring programs (Descriptors D1, D2, D6, and D10) and environmental status assessments targeting references for GES (Good Environmental Status), also contributed to the sustainability goals Number 4 – Quality Education, and Number 14 – Life below water, with the reported data and divulgation/dissemination action contributing to the management of those touristic areas.

**Conclusions**

The present study highlights the visitor's perceptions regarding the main features that can be observed in the Azores underwater touristic sites. Based on the results, this will allow defining more suitable underwater routes to increase visitor satisfaction. It also allowed improving the data available for each spot, increasing the visitor's knowledge about Azores natural environment, and also enabling to inform about conservation and protection management measures and actions.

It was acknowledged by the respondents, following Musard et al. (2014) in the context of a global approach to an area, that the integration of geodiversity features would complement the use of biodiversity to evaluate a seascape. The Azores has a high potential for scuba diving activity (Queiroz et al., 2014) but sites are still underrated due to a lack of marine biology & geology information. The use of the selected criteria allows highlighting the most important features of the diving sites.

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# 160 Old fortification islands opened for visitors in Finland

**Carina Wennström**, Metsähallitus, Parks & Wildlife Finland, Finland

**Introduction**

In 1999 the Finnish government decided to concentrate the management of all state-owned land and water areas to Metsähallitus, which is an unincorporated state enterprise responsible of the management and protection of the state-owned land and water areas in Finland. For example, areas from the Finnish Defence Forces were moved to Metsähallitus. Many of these sites were islands that had been closed to the public for several decades. These sites contain a very rich biodiversity and a strong cultural heritage.

This presentation on how Metsähallitus opened two old military islands to the visitors is a practical example on what kind of management issues can rise when opening new marine protected areas to coastal-marine recreation.

**The Örö fortress island (200 ha)**

Örö is an island situated in Southwestern Finland and it is part of the Archipelago National Park. Landing was prohibited on the island from 1915 until the end of 2014, and the island was opened for boaters and tourists in June 2015.

The fortress on Örö was built by the Russians in the beginning of the 20th century. After Finland's declaration of independence in 1917 Örö was handed over to the Finnish Defence Forces. In 2015, Örö island was transferred to Metsähallitus and added to the Archipelago National Park.

Metsähallitus' goal was and is to develop the island into a functioning, safe and attractive nature and cultural travel destination.

The island is one of Finland's most important areas of endangered habitats and more than 200 endangered or threatened species have been found. The island also has a fine cultural history with barracks areas, cannons, casemates, cobblestone roads, etc.

A masterplan of the island was made up as a consultant work. Recreation and tourism were organized so that they do not jeopardize the island's conservation values. The central development measures where: renovation and continuous maintenance of the buildings, modernization of municipal technology and organization of property management, construction of a guest harbour and marking of boat routes, initiation of connecting boat traffic, construction of a hiking trail network, arranging of the guide and waste management. The strategic masterplan built a frame for investment funding and allowed to open the island for recreation and tourism.

Today Örö has some 20 000 visits yearly. Most of the visitors during the summer are Finnish people on vacation. Örö has rapidly grown to be one of the most important guest harbours in the Archipelago. An entrepreneur is serving as the host of Örö. To follow up the sustainability of recreation and tourism the Limit of Acceptable Change method will be taken into use in Örö and in the whole Archipelago National Park this year.

The opening of Örö has so far been a success story. Of course, there has been challenges as well, but the problems have been resolved. Good contacts and co-operation with local municipalities and the entrepreneurs in the area is a key to success.

**The Vallisaari Island (76 ha)**

The Vallisaari Island is situated in capital region of Finland. It only takes 20 minutes to reach Vallisaari by waterbus from the Helsinki city centre.

In the 19th century the fortification of the Island begun. During the Crimean war intensive fights took place on the sea off Vallisaari. After Finland became independent in 1917 the island continued as a military area. The Finnish Defence Forces gave up the islands in 2008. There were many different opinions of what to do with the island. The location close to Helsinki city centre made the island very attractive, but slowly it became clear that the island would be opened to the public.

Metsähallitus started to prepare the opening of the island to visitors. A master plan of the island was made. The central development measures where more or less the same as in Örö. In addition, restoration work had to be done to save the fortifications. The unique nature tourism destination was opened in 2016.

Vallisaari is the most diverse nature destination in the metropolitan area. For the past decades, Vallisaari has remained in a natural state and is today home for many endangered species.

Recreation and tourism on the islands are based on responsible development. Visitor management is based on zoning, where activities are concentrated to parts of the island as other parts remain untouched. Same as in Örö, an entrepreneur is serving as the host on the island.

Cultural activities will form an important part of the activities on the island. There has already been theatre and dance performances, art exhibitions and concerts and in the summer of 2021 the Helsinki Biennale will be organized on the island.

Past and present challenges

One big issue in the change of the use of the areas was the visitor safety. The Finnish defence forces made the areas safe for visitors before they handed the management over to Metsähallitus. This included removing old military equipment, locking of doors to bunkers and old storage caves. But there remained still a lot to be done to prepare the islands for the visitors.

Expectations among the public were high when people had the possibility to visit the islands again.

Now the buildings and caves on all these islands have been open for users for a couple of years, and the services and safety are being constantly improved. The opening of the islands has brought joy and we get a lot of positive feedback from the visitors.

## 164 Cold water wave surfing and tourism destination developments in Norway

**Reidar J Mykletun**, Stavanger Business School, University of Stavanger, Norway

With a length of 103,000 km, The Norwegian coastline is the second longest worldwide and offers many places with good wave surfing conditions. At the outset, wave surfing was a warm water leisure activity, but modern wetsuits provide thermal protection for surfers that make cold water surfing possible. Since its onset in 1963, surfing in Norway has grown as leisure, sport, and tourism activities. To date, only two papers have focused surfing in Norway. Langseth focused on the construction of surfer identities in Norway, while Elmahdy, Orams, & Mykletun (2021) studied Norwegian surfers experiences and travel behaviour. No official registration of surfing sites exists, and studies have addressed the localisation and development of surfing destinations and possible consequential environmental issues on the Norwegian coastline, which is the focus of this paper. How and where has surfing developed in Norway, and does it threaten conservation and protection goals?

Data for this paper were collected through webpages, media articles, tracing knowledgeable individual surfers, pioneers, and entrepreneurs for interviews by "snowballing", and observing three surfing destinations. As surfers are unwilling to reveal the best sites, a tedious multiple method approach is feasible when tracing these under-researched leisure activities.

Wave surfing began in Polynesia thousands of years ago and is one of the oldest practiced leisure activities (Stranger, 2011). It spread to the rest of the world, initially as a life-style sport, and developed into tourism products and a competitive sport to be represented in the 2021 Tokyo Olympics. Warm seas, white sandy beaches, bright sun, blues skies, and tanned and fit bodies are images connected to surfing. Worldwide, 35 million people surf. Surfing as leisure becomes surf tourism when the surfer leaves his/her local waves to surf in other waters, and for more than 100 years, surfers have travelled to surf and searched for 'the perfect wave' (O'Brien & Eddie, 2013).

Exploring the Norwegian coastline to find remote surf-able waves is a recent adventure tourism (Elmahdy et al, 2021). Surfing may be characterised as an extreme sport involving an intimate dance with the energy of nature (Booth, 2013) but with risk elements when practiced in cold, rough waters. Thus, surfing in Norway developed as a crossroad of adventure tourism, extreme sport, and recreational leisure, and surfers regard the coastlines as their playgrounds. Three main surf destinations have developed, Unstad on the North Atlantic coast of Lofoten, Hoddevik and Ervik at Stadt on the border between the North Sea and the North Atlantic, and Jæren facing the North Sea. Norway Surf Association dates from 1985. As an out-door activity without close interpersonal contacts, surfing has not been restricted by COVID-19 restrictions.

The first surfers in Lofoten (and Norway?) were Thor Frantzen and Hans Egil Krane who had observed surfing at Bondi Beach in Sidney. Back home, in 1963 they surfed on 'home-made' surfboards on the beach of the old small fishing community Ustad. Surfing picked up in Ustad in the 1990's. In 1999, Lamiroy and Hargraves made the epic surf movie E2K at Unstad beach. In 2003, a local, Thor Frantzen, established Unstad Camping which is developed into Unstad Arctic Surf. They provide accommodation, cafe, bar, surf gear rental, surf coaching, stand up paddle tours, conference facilities, private and public events, and other activities, employing 25 persons in the high season. A public support agency, Innovation Norway, supported the development. In 2008, Kristian Breivik developed Lofoten Surfing offering locally made surfboards and equipment for sale and rent. The annual competition Lofoten Masters attract more than 100 domestic and international participants. Unstad is popular with professional and amateurs and has competitive business models.

The second main surf area is the sparsely populated Hoddevik and Ervik on the Stadt peninsula, the westernmost part of mainland Norway. Surfers from Eastern Norway and Sweden dominate in numbers. Non-locals have developed three companies providing accommodation in old houses. Several surf schools offer courses, there is a surf shop, equipment rental service, yoga training, andsurf courses for women only. A Christian Surf Community

is established, who was in charge of the 2016 Norwegian Surf Championship that attracted 50 active participants. The Nordic Ocean Watch, an organisation that cleans beaches, is a unique feature of this destination. Idealism and relaxed life style characterises this destination.

The third destination, Jæren, the long coastline south of Stavanger, offers surfing spots ranging from gentle beaches for beginners to demanding boulder rock points for more advanced surfers. In October 2017 Stavanger Surf Club hosted Eurosurf – the European championship of surfing, having HM, Crown Prince Håkon as a committee member and guest. Jæren was the 'epicentre' for surfing in Norway since most leading surfers started their careers there. It is close to densely populated areas with many local surfers living in its proximity and practicing 'localism'. In 2019, some local surfers raised a small hotel on Bore beach, else surf tourists must camp or stay in hotels in nearby towns. There are several surf schools and shops. These organisations are 'loosely coupled' with low focus on products and service for outsiders.

Conservation and protection have different faces across these cases. Unstad, Hoddevik, and Ervik, are experiencing "over-tourism". Sufficient accommodation, camping areas, and restrooms are lacking. In Unstad, property prices have become extremely high. In Jæren, protection of a rich birdlife and conservation of sand dunes constitute the major concerns.

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# 19 Exploring landscape-scale social and ecological drivers of backcountry sea kayaker campsite selection in Glacier Bay National Park, Alaska, USA

**Susan Sidder[1], Ashley D'Antonio[1], Jonathan Dinkins[1], Christopher Monz[2], Shannon Wesstrom[2]**, [1]Oregon State University, USA. [2]Utah State University, USA

Researchers and land managers increasingly consider parks and protected areas (PPAs) to be integrated social-ecological systems. To apply social-ecological concepts to recreation research in PPAs, researchers must incorporate both social and ecological factors into research on the drivers of recreation behaviors. This research presents one approach for incorporating social and ecological drivers, at the landscape-scale, into a behavioral analysis by applying movement ecology concepts to understand drivers of campsite selection among backcountry sea kayakers in Glacier Bay National Park and Preserve (GLBA).

Located in coastal southeast Alaska, United States - GLBA contains more than 2.7 million acres of federally designated terrestrial and marine wilderness. Backcountry users in GLBA can explore the park's wilderness largely without restriction, camping on beaches open for camping as desired, including in and around the park's unique tide-water glaciers. The lack of site-level camping restrictions in the park enables visitors to recreate, unconfined in the landscape, allowing social and ecological factors encountered to influence decision making. Through generating an understanding of if and how social and ecological factors influence campsite selection in consistent and predictable ways across users, managers can identify hot spots of camping for social and ecological condition monitoring.

This study employed conditional logistic regression in a used versus available design to analyze landscape-scale social, biophysical, and ecological factors hypothesized to influence campsite selection. The biophysical attribute of slope and ecological attribute of the dominant land cover composition together operationalizes the campsite attribute of bare, flat ground, considered to be a necessary attribute among campers in various settings (Brunson & Shelby, 1990). For social factors, respondents to a 2018 exit survey of backcountry kayakers in GLBA indicated that solitude, experiencing wilderness, scenic beauty, and experiencing glaciers were four of the top five factors adding to backcountry experiences (Furr et al., 2019). Given that these factors were identified as adding the most to overall experience, they may also be influential in campsite selection. Variables quantifying exposure to tidewater glaciers may be important as campers may select available sites that provide a near-glacier experience. While this factor is site-specific to GLBA, it corresponds to other experience-oriented campsite attributes identified in other empirical work.

Another social variable incorporated into this approach includes the proximity of selected campsites to other occupied sites. Backcountry kayakers also reported that "solitude" and "experiencing wilderness" were important factors to their overall experience in GLBA (Furr et al., 2019). Being away from other campers enables one to experience solitude and is a component of the traditional conception of a "wilderness experience." Moreover, previous research shows that campsite attributes such as being away from other campers, being screened from other campers, and having privacy are consistently identified as attributes selected for among campers (Brunson & Shelby, 1990; White et al., 2001).

Results from the 2018 survey (Furr et al, 2019) suggest that backcountry users were most sensitive to the presence of cruise ships among a variety of social and ecological experience conditions evaluated. Backcountry users may view cruise ships as visual intrusions disrupting the enjoyment of natural viewsheds, auditory intrusions disrupting the enjoyment of backcountry soundscapes, and/or navigational hazards due to the strength of cruise ship wakes. For these reasons, it is expected that kayakers actively avoid exposure to cruise ships and their potential impacts. Therefore, a variable included in this analysis is the exposure of camping locations to cruise ships or boat tour routes.

This study also utilized a landscape-level approach in analyzing the social and ecological factors. The landscape considered is the area in which

potential campsites are available to each kayaking group each night. Subsequently, all available campsites in the analysis area are incorporated in the analysis. This approach is appropriate for the system, given that among constructs in the movement ecology framework, the greatest amount of variation is anticipated in social, ecological, and biophysical factors perceived by kayakers from their kayaks when making campsite selection decisions; as such, a landscape-scale approach is particularly appropriate for studying campsite selection within GLBA.

Initial results suggest that distance to the nearest glacier was positively related to campsite selection and that ecological factors alone are poor predictors of selection. Effects of social factors and results of an integrated social-ecological model will be presented. Knowledge gained through this research will help managers understand how future shifts in landscape-level factors, such as changes to cruise ship routes, backcountry visitation, or glacial activity may influence campsite use of future backcountry visitors to the park.

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# 71 Differences in the desired environments for marine and coastal recreational spots: an analysis of user valuation at travel- review websites

**Misako Matsuba**, National Institute for Environmental Studies, Japan

## Introduction

Marine and coastal ecosystems have provided us with various recreational services such as beach recreation, recreational fishing, and aesthetic or spiritual spots. These recreational services have attracted attention in recent years from the viewpoint of improving psychological human well-beings as well as providing economic values through sightseeing and recreation. However, quantitative evaluation of recreational services provided by seascape is not enough. In this research, I constructed the statistical model to reveal the relationship between environments and marine and coastal recreational values evaluated by a user valuation at travel-review websites. Then, I applied this model to future climate and demographic changes to assess future threat to recreation services in Japan.

## Materials and Methods

I calculated the values for each recreational service at each site as the number of comments weighted the valuation (zero to five) by users at travel-review websites. To evaluate what environmental factors may affect the value, I constructed a spatially varying coefficient modelling using the environmental variables (population, accessibility to recreational sites, volume of accommodation, sandy coast, protected area, COD, number of endangered species) accounting for spatial autocorrelation. This modelling approach considers the difference in spatial coefficient

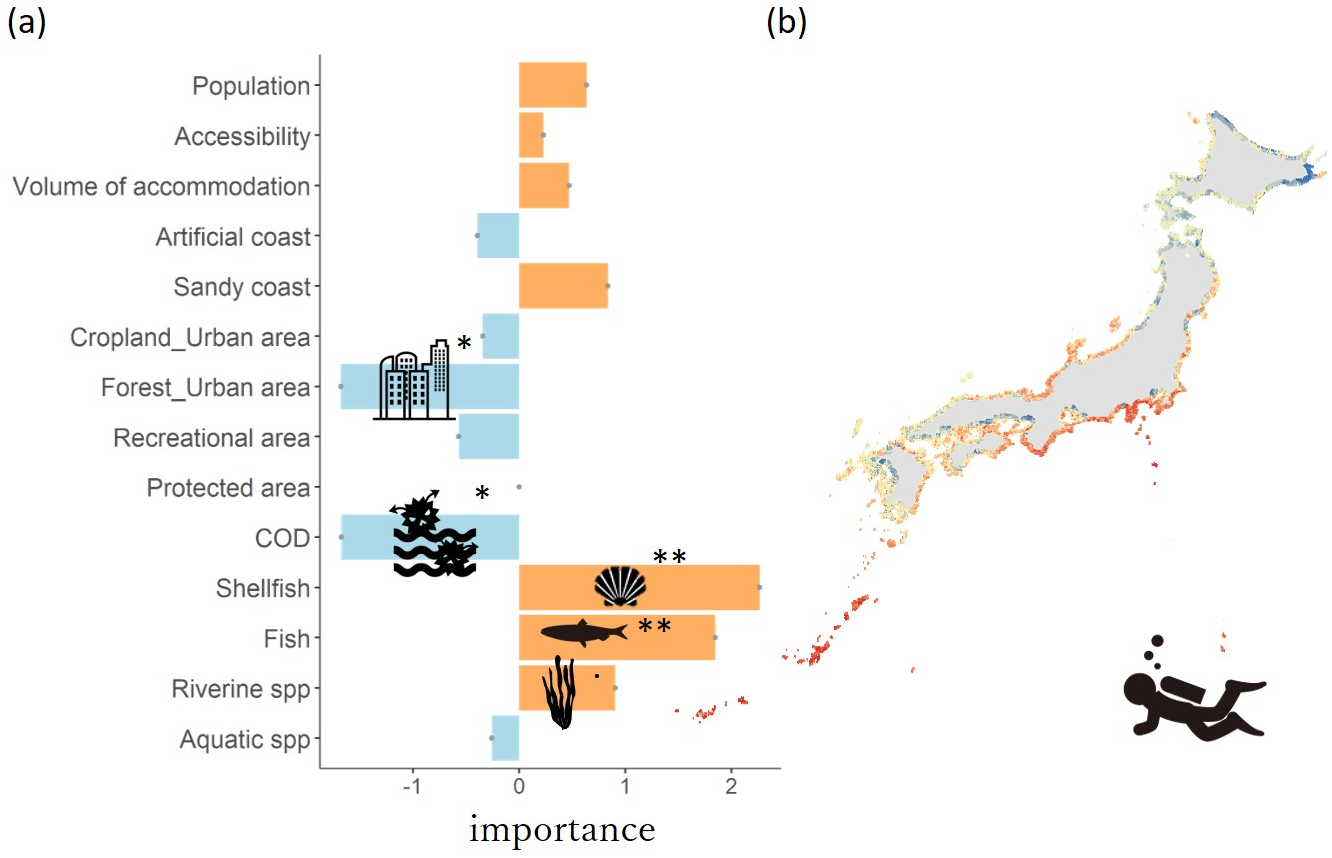


*Figure1 (a) The importance of environmental variables on the recreational values. (b) the spatial estimation of values for diving spots. Red color indicates high recreational value while blue color does low.*

structures of environments using random effect eigenvector spatial filtering with the “spmoran” package in R (Murakami, 2017; Murakami and Seya, 2019). I adapted this method to represent spatial autocorrelation of our data, which may cause inaccuracy of the parameter estimation in models (Griffith and Peres-Neto, 2006). For scenario analyses, I adopted several hypotheses (representative concentration pathways, resilience on natural capitals, demographic distribution pattern) to represent future threats on coastal environment in Japan.

**Results and Discussion**

As a result, beach recreation sites had not only plain sandy landscapes but more accommodation facilities in the surroundings, whereas diving spots were not necessarily located in environments with lots of accommodation facilities (Fig. 1a). In addition, the diving spots tended to be the refuges for endangered aquatic species. For future scenarios, the western parts of Japan would have larger beach loss, indicating the future loss of recreational values there (Fig. 1b). However, other spots such as aesthetic sites showed that the values would be relatively higher in the northern part. These results implied the necessity of regional strategies for sustainable use of recreational values. Further study of the conflicts and synergies among recreations would be beneficial to propose an integrated adaptive management strategy under future scenarios.

# Challenges and opportunities in visitor monitoring and management of UNESCO disegnated sites

| SESSION | PART | DATE | TIME | CHAIRS |
|---|---|---|---|---|
| 1E | I | Tuesday 17th August | 14.00 – 15.20 CET | Arne Arnberger |
| 2E | II | Tuesday 17th August | 15.40 – 17.00 CET | Cecilie Smith-Christensen |
| 4E | III | Wednesday 18th August | 14.00 – 15.20 CET | Arne Arnberger |

| | Programme |
|---|---|
| *1E* | **7** Aletsch Forest in the UNESCO natural World Heritage site Swiss Alps Jungfrau-Aletsch: changes of visitor flows and vegetation in the last ten years |
| | **44** Evaluation of crowding acceptability in national recreation area using field and web-based surveys: A case study in Shiretoko World Heritage site |
| | **154** How many is too much? A methodological approach to determining climbing carrying capacity. The case of Margalef Site – Serra de Montsant Natural Park - Spain |
| | **143** Managing emerging patterns of outdoor recreation - The example of Nockberge Biosphere Reserve, Austria |
| *2E* | **23** Backcountry winter recreation in the UNESCO Biosphere Reserve Engiadina Val Müstair, Switzerland - Developments in the last 10 years |
| | **52** 10 years of the UNESCO Biosphere Reserve of Berlengas: Challenges and pitfalls |
| | **117** Synergies between youth and biosphere reserve. Case of North Vidzeme Biosphere reserve, Latvia |
| | **163** Monitoring of recreation use in Austrian UNESCO Biosphere Reserves – the case of the Wienerwald Biosphere Reserve |
| *4E* | **75** Recreational use in a natura2000 area and stakeholders' ideas about management and maintenance: Citizens involvement, understanding the underlying views and the importance of communication. |
| | **37** Critical indicators for measuring the support for bird protection among visitors in the Dutch Wadden Sea area |
| | **60** Protected area labels as brands in tourism: insights from Germany |
| | **184** VMAST - the UNESCO World Heritage Visitor Management Assessment & Strategy Tool |

# 7 Aletsch Forest in the UNESCO natural World Heritage site Swiss Alps Jungfrau-Aletsch: changes of visitor flows and vegetation in the last ten years

**Adrian Hochreutener[1]**, **Jonathan Pachlatko[1]**, **Martin Wyttenbach[1]**, **Andreas Boldt[2]**, **Reto Rupf[1]**, [1]Institute of Natural Resource Sciences, ZHAW - Zurich University of Applied Sciences, Gruental, CH-8820 Waedenswil, Switzerland. [2]Pro Natura, PO-Box, CH-4018 Basel, Switzerland

**Introduction**

The Aletsch Forest in Switzerland lies within the UNESCO natural World Heritage site Swiss Alps Jungfrau-Aletsch and is one of the oldest of its kind. The 410 ha large forest is protected as a cantonal forest and nature reserve as well as a federal wildlife reserve. The private nature conservation organization Pro Natura manages the area on behalf of the canton of Valais. Recreationists greatly value this pristine nature and each summer many people visit the forest. Management of the Aletsch Forest therefore faces the challenge of finding a balance between use and protection. Utmost priority has the undisturbed natural development of the forest. It is prohibited to leave official trails or resting areas. Still, a sustainable recreational use should be possible. To navigate between these demands and to make effective visitor management decisions, the area management needs empirical data to characterise recreationists (Clivaz et al. 2013) as well as the natural setting (Stankey et al. 1985).

In 1978, a first study was conducted to investigate recreational usage within the forest. Follow-up studies in 1994 and 2008 (Kernen et al. 2010) found an ongoing high pressure on natural resources. Additionally, in 2008, a newly-built pedestrian suspension bridge over a canyon was opened, which soon became a highlight for many recreationists and changed the spatio-temporal travel pattern within the protected area. Once undisturbed areas suddenly faced high recreational pressure, which led to the degeneration of sensitive and ecological valuable vegetation in some of the newly-used areas (Corrodi 2011). Therefore, management established in 2012 a new official, with posts and information boards marked, resting area to guide visitors and to protect sensitive vegetation outside the resting area from trampling and allow it to recover.

The goal of our study was to answer the following questions: 1) How have visitor numbers changed in the past ten years? 2) How has the vegetation inside and outside the then newly-established resting area developed? and 3) Was establishing the resting area an effective tool to guide visitors?

**Methods**

To automatically count visitors, four acoustic slab sensors were installed on main trails (including the trail leading to the suspension bridge) between 26. 6. 2019 and 17. 10. 2019. These numbers were used for descriptive statistics and model building. Additionally, a survey including 431 questionnaires was conducted. Participants were asked to mark their hiking route on a sketch of the area, which allowed the elimination of multiple visitor counts resulting from passing several counting sensors.

Vegetation and its level of damage in and around the resting area was re-surveyed at 20 gridpoints, established in 2011 during a previous study (Corrodi 2011). The perimeter was mapped in predefined vegetation units. In each patch, the percentage of bare soil (soil on which vegetation could grow theoretically but does not because of trampling) was assessed. For example, a value of 30 % means that inside a patch 30 % of the area was bare soil and 70 % was covered by vegetation.

**Results**

During the summer of 2019 approximately 26’000 visitors were counted. Usage was highest around noon, during the summer holidays and on sunny, warm days. Weekdays had no influence on visitation rates. These were among the highest inside the protected area on trails around the suspension bridge. In a comparable period in 2008, when the suspension bridge had just been opened, around 55’000 visitors were counted (Kernen et al. 2010) with similar temporal usage patterns compared to 2019. The 2008 spatial distribution (Kernen et al. 2010) manifested again in 2019. The section around the suspension bridge received a lot of visitor attention.

The re-surveyed grid-points showed that in 2019 the vegetation outside the resting area was intact, while vegetation inside was damaged. Outside the resting area herbaceous plants and mosses dominated, inside shrubs and trees, which are less sensitive to trampling, did. Compared to 2011 (Corrodi 2011), plots outside the resting area regenerated and plots inside degenerated. Additionally, the classification of vegetation units and the assessment of bare soil in each patch showed that patches inside the resting area had significantly more bare soil than patches outside of it (Figure 1).

**Conclusion**

Visitor numbers, compared with those in 2008, dropped dramatically. However, in 2008 the newly-opened suspension bridge generated a lot of visitor attention and visitor numbers were presumably higher than during a regular hiking season. Additionally, in 2019, a local attraction, the hotel Villa Cassel, was closed due to renovations. These two circumstances led to different initial situations and a re-survey of visitor numbers during a regular hiking season is highly recommended.

As a result of the opening of the suspension bridge in 2008, the once remote area with the picturesque lake has become an attraction. Establishment of the resting area led to a spatial concentration of visitors. This has led to damaged vegetation and bare soil inside the resting area. However, vegetation outside of it regenerated since 2011 remarkably.

We conclude that establishment of the marked resting area with information boards was a successful tool to guide visitors in the sensitive environment, since the vegetation outside the resting area was able to regenerate. Finally, locations of new resting areas must fulfil two criteria: 1) vegetation must not be highly valuable or sensitive because (some) damage is inevitable and 2) be attractive for visitors to be accepted (ROS, Nilsen & Taylor 1997).

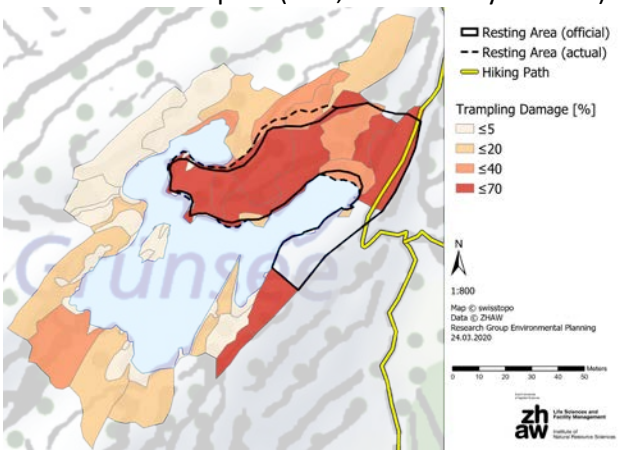


*Figure 1: Percentage of bare soil in the area investigated.*

**Acknowledgements**

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# 44 Evaluation of crowding acceptability in national recreation area using field and web-based surveys: A case study in Shiretoko World Heritage site

**Hyerin Kim[1], Rumi Ito[2], Yasushi Shoji[1], Tetsuya Aikoh[1]**, [1]Research Faculty of Agriculture, Hokkaido University, Japan. [2]Graduate School of Agriculture, Hokkaido University, Japan

## Introduction

Crowding management is an important issue in the field of natural recreation. Our study site at Shiretoko National Park is one of Japan's most popular natural recreation areas, visited by over 1 million visitors every year. Particularly in the summer season, many visitors want to observe bears, causing crowding problems. To solve these crowding issues, it is essential to determine the appropriate carrying capacity in natural recreation areas. To this end, investigating visitors' crowding perceptions (crowding norms) is necessary.

There are various approaches to measuring visitors' crowding norms. More recently, visual approaches have been widely applied. This approach enables the identification of respondents' crowding norms by asking them to identify the most acceptable level of crowding using photographs or illustrations (Manning & Freimund, 2004). As this approach uses photographs or illustrations, respondents can visibly recognize and recall the places in question (Manning & Freimund, 2004).

Many studies investigating visitors' crowding norms have been conducted using field and web-based surveys. However, researchers have given limited attention to explaining how crowding norms differ between fields and potential visitors. When determining the appropriate carrying capacity in natural recreation areas, it is necessary to consider both visitor types' crowding norms; this paper investigates these, providing suggestions for determining the appropriate carrying capacity.

## Material and Methods

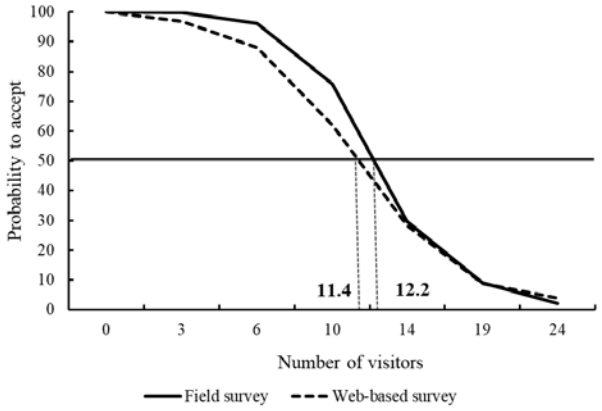
### Study area

The case study site was the Shiretoko World Heritage Site. Shiretoko has been a World Heritage Site since 2005 and is located in the northeastern part of the Japanese island of Hokkaido. It has unique ecological characteristics (e.g., brown bears, foxes, flora), making it a place visited by over 1 million visitors every year.

### Data collection and questionnaire design

Both field and web-based surveys were conducted to compare the results of field and potential respondents. A field survey was conducted at Shiretoko, yielding data from 382 respondents in September 2020. The web-based survey was conducted in October 2020 using a platform developed by a research company. Responses were obtained from registered survey panel members who met the inclusion criteria, and a total of 226 responses were used for analysis.

A short question format was applied to elicit both visitors' crowding norms. This format presents all seven photographs with varying numbers to respondents and asked them to choose one photograph showing an acceptable limit (Aikoh et al., 2018). Based on past studies, the maximum density was estimated and the number of each photographs was determined. In the case of the Shiretoko Kamui-Wakka waterfall site, it was set to 0, 3, 6, 10, 14, 19, 24. From these data, we produced acceptability curve investigating both respondent types' crowding norms.




## Results

Figure 1 shows the acceptability curve of the crowding norms from the field and web-based survey respondents using short question format. The acceptability curve shows the cumulative ratio of respondents who chose the most acceptable photograph among seven photographs (Aikoh et al., 2018). The x-

axis represents the number of people in the photograph, and the y-axis represents the acceptance probability.

The probability to accept decreased as the number of people in the photograph increased in both types' of respondent. We also identified crowding norms for both respondents. As a result, it was found that respondents from the web-based survey had lower crowding norms for the 50% acceptable limit compared to field survey respondents.

**Discussion**

In this study, we were able to elicit both field and potential visitors' crowding norms using field and web-based surveys. We examined both visitor types' crowding norms using short-format questions, comparing their results. It is necessary to understand the awareness of crowding norms of both field and potential visitors to alleviate crowding in natural recreation sites.

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# 154 How many is too much? A methodological approach to determining climbing carrying capacity. The case of Margalef Site – Serra de Montsant Natural Park - Spain

**Estela Inés Farías-Torbidoni[1], Serni Morera-Carbonell[2], Víctor Dorado-Martínez[1], Ricardo M. Nogueira-Mendes[3], David Itúrria[4], Montserrat Sola[4],** [1]National Institute of Physical Education of Catalunya (INEFC). University of Lleida, Spain. [2]Freelance Consulter, Spain. [3]National Institute of Physical Education of Catalonia (INEFC). University of Lleida. Spain. / CICS.NOVA, NOVA FCSH., Portugal. [4]Parc Natural de la Serra de Montsant. Departament de Territori i Sostenibilitat. Generalitat de Catalunya., Spain

**Introduction**

Protected areas (PA) are key territories for protecting biodiversity while also providing opportunities for human-environment interactions through recreation and tourism, activities that have generally grown all over the world. Over the last three decades, due to the improvement of materials, techniques, and methods of physical preparation, one of the recreational/sports use that has increased considerably in PA has been Climbing that has reached unpredictable popularity and technical levels, increasing pressure and impacts over natural and fragile environments.

The Montsant Natural Park, located in the westernmost of the Catalan Pre-littoral range, within the Priorat region, is a special rocky territory with five differentiated climbing areas among which Margalef´s stands out by being a well known internationally climbing spot with over 1500 routes. This PA that occupies 9.242 hectares, received nearly 166.000 visits in 2020, of which almost 55% concentrated in Margalef area (Farías, Morera & Dorado, 2019).

To manage visitation and nature conservation, several carrying capacity frameworks have been developed over the last decades considering all its environmental, social, and economic factors but only a few attempts have been made to operationalize this concept and to transform it into a management tool (Manning 2002). This paper aims to present an adaptation of Cifuentes's Touristic Carrying Capacity (Cifuentes,1992), widely applied in the context of trails, to the climbing routes.

**Methods**

Data collection was done by field observation, survey, literature review considering the Physical (PCC), Real (RCC), and Effective (ECC) carrying capacities, included a discussion group based on the following steps:

1. Design of an initial proposal for the theoretical calculation of the tourist freight capacity based on Cifuentes (1992) with special relevance in the identification of reducing factors.
2. Validation of the methodological proposal through a group of discussion that includes climbers and government responsible and PA managers
3. Checking of the data initially proposed through ad hoc fieldwork
4. Calculation of tourist carrying capacity for zones or management units and comparison with the available flow data.

Correction factors were considered from the number of routes, the average duration of the activity, maximum parking areas up to the average climbing grade available by climbers. In total seven factors were considered to calculate the Real Carrying Capacity (Figure 1a).

**Results**

From a global point of view, the tourist carrying capacity analysis results of Margalef shows a PCC of 4803 climbers/day, a value that is reduced to 183 (RCC) after the application of all reductions factors considered and reached a final number of 140 climbers/day in terms of ECC. Annually, Margalef carrying capacity should be 51.039 climbers, a number that was globally surpassed by 9349 climbers during 2019. Field data from automatic counters shows that this is especially critical since climbing is nor constant throughout the year neither throughout the different management units, with Eastern week and late fall carrying capacity being largely exceeded (Figure 1b).

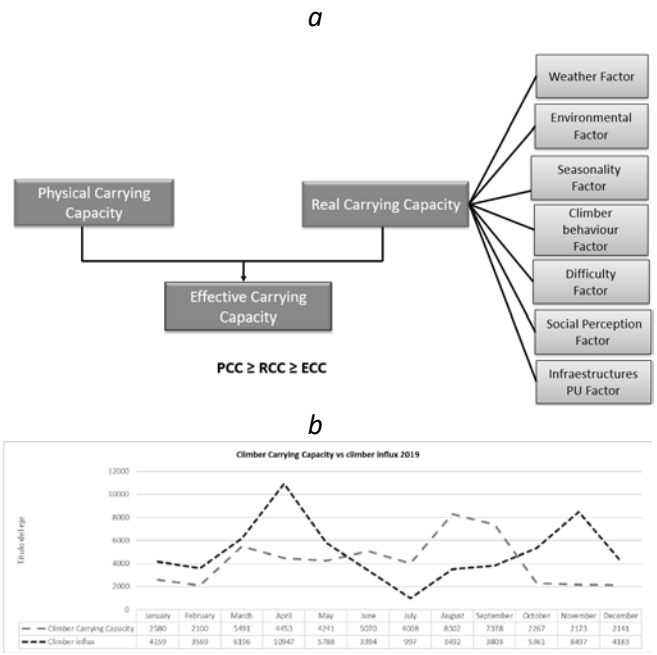


*Figure 1. a) Detail methodology and reduction factors. b) Rock climbing management units Carrying Capacity vs Climber use (2019)*

## Conclusions

In general, the applied methodology has shown adequate to define the Effective Carrying Capacity of climbing in Margalef, being able to identify not just global values, but also critical moments due to seasonal variations that are quite common within outdoor/sport activities in the region. Selected correction factors have proved effective to deal with all major concerns of climbing in the PA being also well accepted by climbers, managers, and government agencies.

Finally, it is also important to note that this work is initial and limited since it is mainly based on theoretical aspects and it is the first time that is applied per complete (including the effective carrying capacity) for rock climbing practice. Nevertheless, it's a starting point that was well acknowledged by all stakeholders. The proposed approach can be used for future development and incorporate ecological and natural values as reduction factors if need. Taking into account the desired monitoring and follow-up evaluation of the proposed methodology, management of climbing and climbers within the park should be fully effective.

## Acknowledgments

This paper was made with the support of National Institute of Physical Education of Catalonia (INEFC) – University of Lleida, with the financial support of Generalitat of Catalunya – Departament de Territori i Sostenibilidad – Parc Natural de la Serra de Montsant.

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# 143 Managing emerging patterns of outdoor recreation - The example of Nockberge Biosphere Reserve, Austria

**Michael Jungmeier[1]**, **Anna Kovarovics[2]**, **Horst Leitner[3]**, **Dietmar Rossmann[4]**, [1]1) UNESCO Chair on Sustainable Management of Conservation Areas, Carinthia University of Applied Sciences, Austria. [2]2) E.C.O. Institute of Ecology, Austria. [3]3) Büro für Wildökologie & Forstwirtschaft, Austria. [4]UNESCO Biosphere Reserve Salzburger Lungau & Kärntner Nockberge, Austria

**Changing patterns of recreational uses**

The COVID-19 pandemic has revealed multiple aspects of human-nature interactions and relationships. In protected areas, for example, the significantly reduced or altered visitor frequencies of the "anthropopause" (Rutz et al., 2020, p. 1156) have opened up the possibility of observing the influence of tourism and visitor behaviour on wildlife. Yet, the pandemic has increased the pressure on many natural sites and protected areas. An inquiry on European protected areas identifies "overcrowding, a new profile of visitors, problematic behavior, and conflicts between different user groups" (McGinlay et al., 2020, p. 1) as corresponding problems. This gives measures for the precautionary proactive management of visitor flows and tourism activities a new relevance.

Protected areas are confronted with the inherent aporetic conflict (Jungmeier et al., 2016) of, on the one hand, enabling the guest to maximise nature appreciation and experience, and, on the other hand, protecting species and habitats from the negative impacts of visitor pressure (Leung et al., 2018). This has given rise to a number of scientific findings (e.g. Arlettaz et al., 2013; Jaeger et al., 2020; Ingold and Blankenhorn, 2005). In addition to a general increase in visitor numbers, new patterns of movement beyond traditional hiking trails (e.g. mountain biking, downhill, backcountry skiing, paragliding, etc.) are leading to a broad distribution and ephemeral appearance of visitors in protected areas. Through social media, new points of attraction, routes or activities are emerging, over which the management of protected areas can exert diminishing influence. Reaction times have shortened and selective overtourism at specific hotspots is increasingly becoming a problem ("instagram-tourism").

The management of visitor flows, especially in iconic landscapes, must respond to these challenges. In our contribution, we would like to use the example of visitor management in the Nockberge Biosphere Reserve (BR) to work out the associated possibilities, limits and challenges.

**Participative development of solutions**

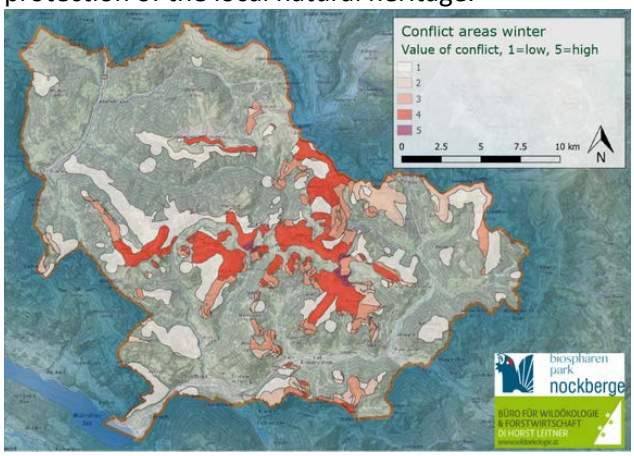
With an area of 149,000 ha, the Salzburger Lungau & Kärntner Nockberge BR is the largest BR in Austria. The BR is located in two federal states. The Carinthian Nockberge part was originally designated as a national park but was reclassified as a BR because of its rural cultural landscapes. The Nockberge mountains are embedded in an attractive tourist region that offers a wide range of activities for all seasons.

Some of the tourism opportunities are developed and implemented by the BR itself. These include thematic trails, visitor information points and exhibitions, and educational programnes ranging from guided winter snowshoeing excursions to webinars about different topics and school programmes for students of different ages. Many possibilities in the park are also open to individual tourists, such as the scenic Nockalm Road, hiking trails and touring routes. These are used by motorised guests (cars, motorcycles), hikers, cyclists, ski tourers and other sportspersons. In this context, problems repeatedly arise not only with sensitive areas and nature conservation requirements, but also with hunting interests and landowners.

Within the framework of a large-scale study (Leitner et al., 2019), the areas of conflict between nature conservation, hunting and outdoor recreation were identified, discussed and resolved with broad consensus among the different stakeholders. In the sense of evidence-based management, the scientific facts were first collected and established beyond dispute. The most important stakeholder groups were already involved in the collection and preparation of the most critical facts.

The project started with four major informational events to inform the people of the BR about the main contents of the project. Data on outdoor activities were collected via interviews, maps and online providers. The combined knowledge of wildlife ecology by both local hunters and experts was used to determine the core habitats of six umbrella species (Cervus elaphus, Rupicapra rupicapra, Tetrao urogallus, Tetrao tetrix, Lagopus muta, Alectoris graeca).

The overlaps of areas used for recreation with core wildlife habitats revealed so-called conflict-areas (Map 1). Based on factors including the conservation status of the area and wildlife, the number of affected species and intensity of recreational activities, the potential of conflict was distinguished within each area. This zonal classification of potential conflict forms the basis and starting point for future measures for nature conservation and the protection of the local natural heritage.




Map 1: Different values of conflict in the Kärntner Nockberge Biosphere Reserve in wintertime. *As part of the GIS analysis, touristic uses in summer and winter were spatially recorded and overlaid with the habitats of sensitive species.* The resulting conflict map shows the areas with a particular need for action.

**Conclusions and perspectives**

Biosphere reserves are, according to UNESCO definitions, "learning places for sustainable development"(www.unesco.org/biosphereand therefore carry unique challenges to develop appropriate management measures. According to the concept of a BR, these measures should be elaborated and developed in participatory coordination with the users and interests involved (Egner et al., 2017). In the described project, BR is central to the emotional triangle of nature conservation - hunting - tourism. In this context, evidence-based action and the insights of involved stakeholders shall lead to long-term solutions that are successful without and beyond external measures.

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# 23 Backcountry winter recreation in the UNESCO Biosphere Reserve Engiadina Val Müstair, Switzerland - Developments in the last 10 years

**Reto Rupf**, **Jonathan Blank Pachlatko**, **Martin Wyttenbach**, Institute of Natural Resource Sciences, ZHAW - Zurich University of Applied Sciences, Switzerland

**Introduction**

The UNESCO Biosphere Reserve Engiadina Val Müstair is situated in the easternmost part of Switzerland at the border to Italy. Since 2010, together with the Swiss National Park, it forms Switzerland's first UNESCO biosphere reserve in the alpine region. The biosphere reserve is well known for its wildlife such as the ibex, chamois and red deer as well as grouse such as the black grouse and capercaillie (Tetrao urogallus). The latter is a large woodland species with very specialized habitat preferences. Its population has declined in recent decades in Central Europe and therefore the species is classified as 'endangered EN' on the Swiss red list of breeding birds. Due to cold conditions with high snow cover and a lack of feed, capercaillies are very sensitive to disturbance in winter.

At the same time, Val Müstair biosphere reserve is a renowned backcountry winter recreation area which attracts many visitors who are passionate about winter sports activities like snowshoeing or ski mountaineering. As a consequence, the issue of conflicts between backcountry activities and conservation has emerged. The situation from 2008 to 2010 was analysed by Rupf et al. (2011). It could be demonstrated that winter recreationists travel quite often through capercaillie core habitats.

According to Swiss nationwide representative surveys from 2008 to 2020, the number of declared active winter backcountry sports recreationists has increased by 275 % from about 165,000 to 455,000 (Lamprecht et al., 2009, 2015, 2020). Additionally, Haegeli et al. (2019) and Rupf et al. (2019) state that some backcountry visitor groups look to avoid crowds and therefore enter new terrain, even though it would increase their risk of being caught by an avalanche. Based on those findings, there is an implication that the wildlife habitats will continue to subjected to the pressure of recreational backcountry winter sports activities.

In this article we will address following research questions:

1) Could increased numbers of winter backcountry recreationists also be observed in the countryside, specifically in UNESCO Biosphere Reserve Val Engiadina Val Müstair? – How have the numbers of usage changed in the last ten years?

2) What effects did a forest clearance on a ski mountaineering route have for its neighbouring wildlife habitats?

**Methods**

Using passive infrared counters Ecocounter® and automated cameras Reconyx®, we counted hits at two different sites along official ski mountaineering and snowshoeing route to Munt Buffalora and Piz Dora – the counters were doublechecked manually or by cameras. To generate a correction term for the long count series of the infrared counter, we used the count of 30 days of the camera data. The two windows of time were tested for significance using the two-tailed t-test for dependent samples. The counting period took place in winter 2010/11, 2019/20 and 2020/21, from 15 December to 15 March.

The spatial use of the backcountry recreationists was investigated in 2008-2010 by means of GPS loggings (Rupf et al., 2011); consequently, we were able to analyse 501 total trips of 303 ski mountaineers and snowshoers with a special focus at the northern slope of Piz Dora. In winter 2019/20 we applied a different visitor monitoring technique – some days after fresh snowfall, we took pictures by a telephoto lens positioned at village Lü on the other side of the valley. With the Adobe Photoshop software we merged the overlapping single pictures to an entire composite photo. The open alpine forest with European larch and Swiss stone pine allowed us to detect and to count recreationists tracks in the snow cover. For statistical analyses we used the R software.

**Results**

Comparing the two counts ten years apart shows a highly significant increase in hits in the two-tailed t-test ($p < 0.001$). Whereas the 2010/11 survey averaged 71 visitors counted per day, in 2020/21 we recorded 134 visitors per day on average. This

corresponds to an increase of ski mountaineers and snowshoe hikers of almost 89 %.

The spatial use of the sensitive capercaillie area by backcountry recreationists detected through GPS-Loggers, however, could be greatly reduced by the silvicultural measures (planned after the survey of 2010/11 with the wildlife authorities). In 2019/20 the evaluation of three periods of counter-slope photos after fresh snow fall followed by days of fine weather shows the strong tendency of the backcountry recreationists to use the cleared forest corridors for the descent. This behaviour, whether conscious or unconscious, protects the neighboured forest areas of the capercaillie patches well; out of 537 tracks counted in total, only four took the direct descent through the forest (see Figure 1, results of the third counter-slope evaluation).

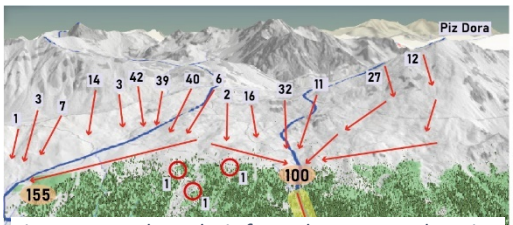


*Figure 1: Track analysis from the counter slope images (16.03.2020, ten days after the last snow fall). Three out of 255 tracks in the descent missed the two canalising forest corridors, which were extended by forestry as a capercaillie protection measur*

**Discussion and conclusion**

Regarding the monitoring methods used, the infrared counters worked quite well, which was confirmed by high correlation with camera counts. One must be aware that the visitor numbers are affected by weather and snow cover conditions and, especially in 2020, by Covid19-lockdowns. However, the period under review excludes the lockdown (start of the lockdown in Switzerland: 16 March 2020); despite these variables, we will continue to operate our infrared counter at the Munt Buffalora route in the coming years.

While our data of the Val Müstair certainly show an increase in the number of recorded backcountry winter sports trips, they did not confirm the vast increase of winter backcountry recreationists predicted by the Swiss sports studies (Lamprecht et al., 2009, 2015, 2020). Reasons could be the quite remote location of the UNESCO Biosphere Reserve Engiadina Val Müstair, that the recreationists do not pursue their activity so often as ten years ago or they overestimate their number of trips.

A success story seemed to be the clearance of the forest at the skiing route. Hardly any inappropriate tracks could be detected in the last years. Different factors could have led to this result: firstly, the communication campaigns of the management staff regarding endangered wildlife species and proper recreationists behaviour rules and secondly, the skiers and snowshoers were able find their correct way down clearly because of the open forest corridor.

Nevertheless, sensitive recreationist behaviour is needed, and more backcountry winter sports activities has to be anticipated. To address this, the authors have established a wildlife management concept for the whole Val Müstair in collaboration with the stakeholders. Core elements in its implementation are ongoing wildlife and visitor monitoring and semi-annual management meetings with all stakeholder groups for summer and winter recreation each.

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## 52 10 years of the UNESCO Biosphere Reserve of Berlengas: Challenges and pitfalls

**Carlos Pereira da Silva**[1], **Ricardo Nogueira Mendes**[1], **Catarina Fonseca**[2,1], [1]CICS.NOVA, Interdisciplinary Center of Social Sciences, Faculty of Social Sciences and Humanities, University Nova de Lisboa, Portugal, Portugal. [2]cE3c – Centre for Ecology, Evolution and Environmental Changes & ABG - Azorean Biodiversity Group; Faculty of Sciences and Technology; University of the Azores;, Portugal

The protected areas, including UNESCO Biosphere Reserves, have been witnessing an increase in the number of visitors, resulting in periods of human overload, which can compromise the development strategy, conservation objectives, and the quality of the recreational experience. Information about visitors is therefore vital to create new management strategies, which also include education and environmental awareness.

Now, that in 2021 we are celebrating the 10th anniversary of the UNESCO Biosphere Reserve of Berlengas (Portugal), it is appropriate to assess the evolution in the last decade, mainly about visitation, and consider the challenges ahead.

The Berlengas Archipelago and the city of Peniche are classified as a UNESCO Biosphere Reserve since 2011. Besides the city, includes a small island surrounded by several islets and two other groups of islets located near the coast of Peniche, about 7 nautical miles from the mainland. The entire archipelago and the surrounding marine area (9,456 ha) are also classified as a nature reserve due to their remarkable importance, recognized as a bird sanctuary with flora and fauna species where several endemisms prevailing.

The honeypot of this UNESCO Biosphere Reserve is the Berlenga Island (Figure 1), the only island that can be visited is with circa 79 ha. The main attractions are, according to Gil (2018), the small pocket beach and the 17th-century Fortress. Off-trail is strictly forbidden according to the natural reserve zoning plan, which together with the island morphology limits the visitors 'use to less than 10% of the island.

In the last years, visitation became quite popular, starting to be a serious problem that needed to be addressed by managers. Most of the visitation happens within the late spring and summer months due to harsh sea and weather conditions. During this period there are some support infrastructures (a restaurant, a camping site, plus 60 ~ 70 touristic beds) and regular boat service.

The visitation season is split into two periods depending on the number of trips done by the regular boat service: in July and August there are two during the morning and a third one in the afternoon; from mid-May to June and during the first half of September there is only one trip. In addition to this regular service that can carry up to 180 passengers per trip, there are several companies operating tours to Berlenga Island in 25-30 small boats (each carrying between 12 and 32 passengers per boat).

Despite the limited access and the protected status, visitation was never systematically being monitored. Nevertheless, the management body of the nature reserve estimated around 25,000 visitors in 1998, 30,000 in 2000, and 40,000 in 2003 and 2004 (ICNB, 2007). In the following years, although no estimations have been made, there was a general perception of a dramatic increase in the number of visitors, far above the maximum allowed number of people that could be on the island at the same time (350 according to Regulation 270/90, of 10 April), which could endanger the natural values as well visitors 'experience.

Project LIFE Berlengas (LIFE13 NAT / PT / 000458), under the Life Program of EU, took place between 2014 and 2019 with the main focus of recovering the natural values of the Berlenga island, under threat due to a continuous degradation thanks to the excess of visitation and proliferation of exotic species that compete with local fauna and flora.

The LIFE Berlengas project also developed a set of actions to test different techniques for collecting and monitoring information (quantitative and qualitative) about the Island's visitors to provide local managers and other involved stakeholders new insights regarding Berlengas' carrying capacity.

Among the problems detected, there was a significant increase in visitors, now more than 80000 per year, with safety implications, the rise of litter,

and a decrease in the quality of the recreational experience (Mendes et al 2020).

Several workshops took place with local stakeholders to create awareness of existing problems and also involve them in the proposal of solutions for greater sustainability of their activity, thus preserving the existing natural and human values, which is the reason for the attraction of so many visitors.

A recent survey also conducted among the stakeholders for the periodic review of the 10th anniversary of the UNESCO Biosphere Reserve, also shows a clear satisfaction with the implementation of the Reserve, e even if there is a clear contrast between the assessment of nature conservation and human development goals, that need to be addressed in the future.

The results achieved were crucial to assist in the monitoring and decision making of management measures, as well as in the awareness of visitors avoiding the several pitfalls ahead that jeopardize the area in the close future (Gil, 2018).

A new regulation is now being implemented to reduce the number of visitants but also increasing the value of recreational experience, namely with guided tours and local panels with information about natural and human values in presence.

A different code of conduct of tour operators, a interpretation center, and more recently the implementation of a process of co-management of the Natural Reserve with the involvement of the local authorities seems to step in the right direction for the sustainability of the area.

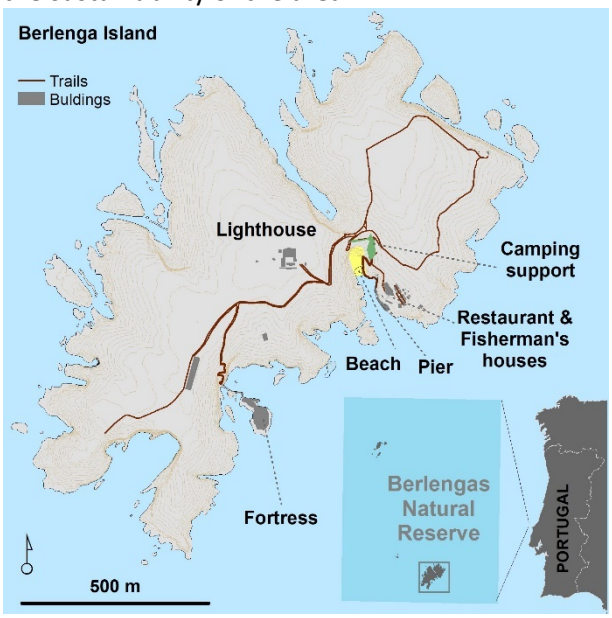


*Figure 1 - Berlenga Island*

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# 117 Synergies between youth and biosphere reserve. Case of North Vidzeme Biosphere reserve, Latvia

**Anda Arklina**, Institute of Social, Economic and Humanities Research of Vidzeme University ofApplied Sciences, Latvia

> *"No one will protect what they don't care about; and no one will care about what they have never experienced."*
> /David Attenborough/

The COVID-19 pandemic proved that natural areas play an important role in human daily life and even more in their leisure time activities. Managing institutions of specially protected areas are paying more attention to planning tourism infrastructure without harm to the environment and show members of society, especially youth, that these areas are open for people.

More and more questions have been raised about young people and their motivation to visit protected natural areas in order to raise awareness and ensure nature protection in the future (Egan, 2016). It is important to understand why travelers go to visit nature tourism attractions and what influences their decision or motivation to go there in order to be able to prepare and offer an appropriate service. Nature experiences can have a very strong emotional impact on a personality, especially a child or young person (Falgoust, 2017). As it is mentioned in Mab Youth Forum declaration 2019 "Children and youth are among the most vulnerable groups to the effects of environmental degradation".

Motivation is characterized by three things: drive, purpose, and need. There are a significant number of designed and redesigned tourist motivation theories, but Metin (2019) distinguishes 4 main groups of nature tourism motivations: novelty-self-development, return to nature, knowledge, and a healthy lifestyle and escape. Researchers point to the emergence of a new hybrid tourist, defined as a tourist seeking several needs to be met at the same time: recreation and entertainment, spending time with friends and physical activity. This confirms that classical theories of motivation for young people need to be studied in an integrated and complex way (Raunio, 2014; Grinfelde & Livina, 2016).

The North Vidzeme Biosphere Reserve (NVBR) was chosen as the study area because it is the largest protected area in Latvia, covering 6% of the total area of Latvia. The reserve was established in 1997 and was recognized as a protected territory of international importance in the framework of the UNESCO MAB program on December 15, 1997. The NVBR represents the terrestrial and coastal 10 Baltic sea ecosystems, also covering river basins of the coast of Gulf Riga. It includes 10 administrative counties (fully and partially) with a total area of 457,708 hectares (DAP, 2019). More than half of the NVBR terrestrial area is covered by forests and swamps. The area also includes 24 nature reserves, 1 nature park, and 2 protected Natura 2000 marine areas.

The NVBR area is attractive for tourists for its amazing natural attractions: the Salaca river, Burtnieks Lake, Randu meadows, Vidzeme rocky seashore, and a variety of swamps and boglands, providing nature trails and watching towers. The area is also crossed by long-distance hiking and velo routes: Baltic Coastal Hiking (route E9), the Forest Trail (route E11), and EiroVelo 13 (also known as the Iron Curtain Trail). Tendencies show that knowledge and recognition of the area is increasing (1).

Methodology. To achieve the aim of the research, the integrated research method was used. Between May and August 2019, an online survey of the behavior of Gen Z and Gen Y with main purpose to explore motivation and influencing factors for young people to visit the NVBR. A total of 317 questionnaires were obtained, of which 295 were valid for processing the results. Three focus group discussions and after three observations in nature was used for qualitive research method. The aim of the focus group discussions was to find out the learning habits and understanding of the natural and cultural heritage of Gen Z as a value in the context of travel. Each focus group included 5-7 participants, all of whom were born between 2000 and 2005. The novelty of the present study is that for the first time in

Latvia, the potential target audience of protected area is analyzed from the generational perspective.
Of all of the online survey respondents, 65% were young people in the age group 15–19, and 35% were in the 20–25 age group. However, even though they were visiting the reserve or even living in it, there were instances where participants did not know that it is a part of NVBR. Furthermore, when asked about their associations with the area, participants mentioned negative things like “something very complicated”, “protected are where is not allow to visit.”

The main motivations to visit the biosphere reserve were push and pull motivation: to relieves stress, to socialize, to escape from daily life, to do activities, to vitalize respondents’ daily life, to enrich knowledge, and to gain a new and unique experience. They have a positive attitude towards spending time in nature and traveling in nature as one of the most relevant leisure time activities.

Youth want to receive information that is well visualized, so it is very important for tourist information to have visual material, notably, high quality pictures. They are seeking interactive involvement, the use of all senses, technological solutions. Acquiring new knowledge must be an added value.

It can be concluded that young people currently lack information and education about the existence of such protected areas as the biosphere reserve in Latvia, about the fact that the biosphere reserve is freely available with well-equipped infrastructure for society. Since young generations are technologically savvy and value adventure and new experiences, it is suggested to develop initiatives with elements of play and competition to raise young people's awareness of protected natural areas and to motivate them to visit NVBR among like-minded communities.

There was a tendency for young people to plan their time more carefully, trying to devote most of their time to leisure and leisure activities rather than compulsory activities. Therefore, it is very important to remember that when creating tourism offers for young generations, there must be room for spontaneity, creativity, and time and space for photographs.

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# 163 Monitoring of recreation use in Austrian UNESCO Biosphere Reserves – the case of the Wienerwald Biosphere Reserve

**Arne Arnberger**, **Renate Eder**, University of Natural Resources and Life Sciences Vienna, Austria

## Introduction

UNESCO's MAB Programme and its World Network of Biosphere Reserves (WNBR) play a key role in the integration of biodiversity conservation in sustainable development. Since 1976, when the MAB Programme designated the first 57 BRs, the Programme has undergone many significant developments. Meanwhile, the WNBR includes more than 700 BRs in 129 countries (Köck & Arnberger 2017). BRs include not only attractive landscapes and specific landscape features but also settlement areas, and can even include parts of larger cities. Such areas are exposed not only to high overnight and day tourism pressure but also to the everyday recreation of even millions of urban residents.

Austria established its first four BRs in 1977. These first generation BRs were removed from the WNBR between 2014 and 2016 because of not fulfilling the renewed criteria for BRs (Köck & Arnberger 2017). Two of these BRs were located in East-Austria and part of national parks. While for the former Untere Lobau BR, which is part of the city of Vienna, a rich and long-term data base on recreation uses exists (Arnberger 2006), there is little knowledge on recreation uses of the former Neusiedler-See BR. Between 2000 and 2019, four second generation BRs were established, among these the Wienerwald BR (WBR) located in East-Austria.

## Study Area

The WBR extends across the two federal provinces of Vienna and Lower Austria and covers an area of about 105,000 hectares. About 850,000 people live in biosphere reserve communities or city districts of Vienna. Within the WBR 37 areas are designated as core zones, in which nature protection is the main goal. Recreation use is possible along officially marked trails, whereas mountain biking and horse riding are not allowed in core zones and biking use limitations exist for specific day times depending on season. Due to many different activities and interests, which take place in the WBR, a high conflict potential exists. Interaction between different user groups and interests provide a key challenge to BR managers as the interactions may lead to conflicts.

## Overview on studies on visitor monitoring and user conflicts

Meanwhile a range of studies dealing with recreation uses of the WBR exist (Table 1). Since several decades, recreational user conflicts are a main topic. Bürg et al. (1999) identified bicyclists, followed by dog walkers as the most disturbing user groups. A previous project (Reimoser et al. 2008) and an ongoing project (Eder 2019) focussed on user conflicts too. Eder (2019) investigated systematically perceptions of user conflicts in the WBR by the use of on-site interviews and participatory GIS. First results indicate that conflicts are not a major topic. Most conflicts arise with dog walkers and mountain bikers but perceptions of conflicts heavily depend on activity type.

Visitor counting in the WBR over longer periods took only place at two urban sites (Arnberger & Eder 2007, Arnberger et al. 2006). These studies quantified the total use and found that use pressure ranges between 200 visits/ha a (Lainzer Tiergarten) and 2000 visits/ha a (Ottakringer Wald). While in the Lainzer Tiergarten bicycle use is not allowed, the Ottakringer Wald is heavily and partly illegally used by mountain bikers. Increasing conflicts between mountain bikers, landowners, forestry and nature conservation have resulted in a mountain bike and visitor use monitoring using automatic counting devices in and nearby heavily used core zones of the WBR (Arnberger et al. 2018).

| Studies | Methods | Years | Sources |
|---|---|---|---|
| Survey among Viennese population | Telephone survey (face-to-face interviews) | 1989-1998 | Bürg et al. 1991 |
| 1-yr visitor monitoring at the Ottakringer Wald (Vienna) | Video monitoring<br>Human observers<br>On-site interviews | 2004-2005 | Arnberger & Eder 2007 |
| Visitor surveys at specific sites of the BR | On-site interviews | 2005-2008 | Reimoser et al. 2008 |
| 1.5-yr visitor and mountain bike use counting at several sites (Vienna/Lower Austria) | Bicycle counters (tubes) and passive infrared counters | 2015-2017 | Arnberger et al. 2018 |
| Visitor surveys at specific sites of the BR | Participatory-GIS<br>On-site interviews | 2018-2021 | Eder 2019 |

*Table 1. Example studies on monitoring recreation use and visitor conflicts in the Wienerwald BR*

## Discussion and conclusion

The conflict situation in the heavily used WBR seems to similar compared to the situation 30 yrs. ago. Main conflicting recreational uses are mountain biking and off-leash dog walking. For few areas only within the WBR knowledge on the total number of visitors exists. No visitor monitoring system is currently in place to document changes in recreation use levels due to the impact of the COVID crisis.

Managers of all Austrian BRs claim that use levels have drastically increased in their BRs during the COVID crisis and have recently expressed an urgent need for information on visitor uses and management. A standardized and long-term monitoring system with visitor counters, onsite interviews and population surveys may be implemented in all BRs.

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# 75 Recreational use in a natura2000 area and stakeholders' ideas about management and maintenance: Citizens involvement, understanding the underlying views and the importance of communication.

**Martin Goossen[1]**, **Lianne Dekker[2]**, [1]Wageningen Environmental Research, Netherlands. [2]Wageningen University Research, Netherlands

We conducted a recreation study in the Jufferswaard, a 31 ha floodplain in the municipality of Renkum with 30.000 inhabitants in the Netherlands. In this Natura 2000 area with recreation we counted the use, conducted a stakeholder analysis, qualitative interviews and an user's survey. In contrast to the amount of nature data, there was no recreation data for this area. The Pilogroep, a group of active citizens in the municipality, asked us for this data.

In the period 2018-2019 we counted the amount of recreational visits for one year with passive infra-red (PIR) sensors at the four entrances. We used LoRaWAN (Long Range Wide Area Network) technique: a telecommunications network that allows data to be sent to and from wireless sensors over a long distance gateway. On eight days, we counted the amount of visitors manually to check the PIR-data. The accuracy of the PIR-sensors was 75%. There are 55,000 visits a year, mainly from residents of the neighbouring villages of Renkum and Heelsum. On average there are 150 visits per day, mainly between 12.00 and 14.00. Sundays are by far the busiest days.

The stakeholder analysis looked at what wishes were involved about management and maintenance and how much influence the various stakeholders have. According to the Pilogroep, the accessibility of the walking paths could be improved in the area. They also have wishes for the preservation of cultural history in the area. These wishes are not directly shared by the owner of the Jufferswaard: Federal Forest Service Staatsbosbeheer. They maintain the area soberly. The wishes for the area were explained on the basis of nature images consisting of different management. The Pilogroep has a more functional nature image and Staatsbosbeheer a more wilderness nature image, although the Natura 2000 status does not necessarily require a wilderness nature image. The influence of the Pilogroep is limited in contrast to Staatsbosbeheer as an owner. But citizens involvement is important to Staatsbosbeheer.

The inhabitants of the municipality of Renkum were also heard by means of an online survey, partly based on the results of three qualitative interviews. A call to participate in the survey has been posted on facebook of local organizations and a message in the local newspaper. Also 1204 flyers were handed out in the area, at supermarkets and every 5$^{th}$ address in the streets of the villages Renkum and Heelsum. This resulted in 295 respondents. In the survey the respondents were asked about their wishes, nature images, use and recreational motives. The main wish was to clean up waste in the area. Their nature images is more aesthetic. Walking (with or without a dog) is the most popular activity. And 'having a break' was the most mentioned motive to visit the area.

It appears that although the nature images of the most important stakeholders, the Pilogroep and Staatsbosbeheer, differ, a compromise can be reached on the wishes of the Jufferswaard. This requires an improvement in communication on both sides. For the Pilogroep it is important that they present an unambiguous vision to the other stakeholders. For Staatsbosbeheer it is important that they communicate more from nature experiences, because this is closer to the image of nature of recreational users. In this way the tension we see in de Jufferswaard between a more hierarchical role for the manager, who has to comply with statutory agreements related to the Natura 2000 status, and citizens' initiatives that expect a more collaborative and responsive role of the managers, can be resolved. A situation can then be created that leads to cooperation on the basis of knowledge, communication, understanding and trust in which the Pilogroep is heard and in which Staatsbosbeheer can benefit from the involvement of the Pilogroep. This could ultimately lead to a kind of management covenant.

It is positive for the Pilogroep that it is deploying its waste disposal activities (Staatsbosbeheer as manager is responsible for that) to show that it is in the process of putting into practice one of the most important wishes of the inhabitants and of the stakeholders. Through a networking and cooperative management style, Staatsbosbeheer can fulfill their desired policy of “experiencing nature together”.

The results of this knowledge-based project can serve as an example for other Natura 2000 areas in the Netherlands with similar issues and tensions between management styles.

# 37 Critical indicators for measuring the support for bird protection among visitors in the Dutch Wadden Sea area

**Akke Folmer**[1], **Sjors Schuurmans**[1,2], **Ben Wielenga**[1], [1]NHL Stenden, Netherlands. [2]University Wageningen, Netherlands

**Introduction**

*"Onbekend maakt onbemind"* [Unfamiliar makes unloved], is a typical Dutch saying that refers to unfamiliarity with a place, with food or something else, leading to a lack of emotional connection, support and/or care. With this in mind, nine nature organisations in the Netherlands want to increase awareness on the special nature values of World Heritage Site the Wadden Sea area among a broad public, with the overall aim to enlarge support for nature and bird protection. Their campaign is part of a larger multifaceted project called "Wij & Wadvogels" ["We and Wadden birds"], which is running from 2019 to 2026. The project is unique as it does not only focus on physical measurements to improve the natural habitat of birds (restoration and expansion of resting, foraging and breeding places for birds); it also includes the social valuation of nature, with the focus on birds. The project aims to offer new sustainable forms of bird recreation which should result in increasing support for nature and birds (Vogelbescherming, 2018). This aim underlines the importance of gaining more insight into which aspects contribute to a higher support for nature and bird protection most.

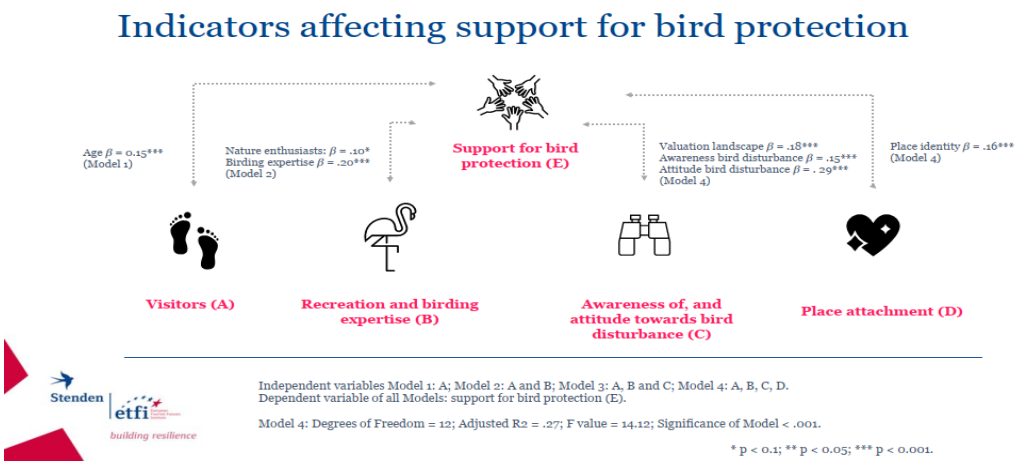
In this paper, we investigate indicators which predict support for bird protection among visitors to the Wadden Sea area. These indicators will be part of a monitoring system which monitors the effectiveness of activities of the project from 2021 to 2026. Due to the corona crisis, the actual monitoring could not start yet, as the type of visitors was expected to differ significantly from a 'normal' year. Especially the relatively high number of first time visitors was notable. On the other hand, this gave us more opportunities to investigate differences between visitors.

**Study area and data collection**

The location of our study is the UNESCO World Heritage Dutch Wadden Sea area, in particular two popular tourist destinations: the harbour of Lauwersoog on the mainland, and the island of Texel. Due to the corona crisis, there were less visitors from abroad, whereas there were more visitors from the West and South of the Netherlands who visited for the first time (e.g. see Folmer, Revier and Cupido, 2016; De Vries et al., 2013). Data was collected by using face to face questionnaires. A total of 421 respondents were gathered, 213 in Lauwersoog, and 208 on Texel.

**Measurement instrument**

Based on an extensive literature review, we identified the main concepts that are expected to contribute to support for nature and bird protection. The operationalization of the concepts was based on previous studies on place attachment by Folmer (2013ab), Hammitt and McDonald (1983, 2006), Moore and Graefe (1994), and Budruk et al. (2011), support for nature protection (De Boer & Langers, 2017), and effects of recreational activities on bird disturbance (Van Haaren, Querl, & Vertegaal, 2002). Several specific questions about the project Wij & Wadvogels were added as well. The data analysis consisted of factor analysis, scale formation, reliability analyses, transforming nominal variables into bivariate variables, and carrying out two multiple linear regressions, one to predict support for nature protection and one to predict support for bird protection.




**Results**

In general, age mattered significantly. Older visitors had visited the Wadden Sea area significantly more often than younger visitors, they had more bird watching expertise, were more involved in nature protection, took birds more into account during their recreational activities, and had a stronger place attachment.

In our Models, we predicted 21% of variance in support for nature protection, and 27% of variance in support for bird protection (See Figure 1). Some differences in strength of the indicators were found. Involvement in nature protection, and the number of previous visits mattered more in predicting support for nature protection, whereas age predicted support for bird protection better. Especially the perceived attitude towards birds by taking birds into account during recreational activities was a much stronger predictor of support for bird protection than nature protection.

**Conclusions**

We found that, to increase support for bird protection, it is important to increase expertise (knowledge and experience) on birds, for instance by giving opportunities to watch birds in birdwatching huts; increase awareness on the effects of outdoor recreation on bird disturbance, and give tips on how to take birds into account during recreational activities. These aspects relate significantly to a stronger attachment to the Wadden Sea area, which in turn increase support for bird protection.

Management implications

Nature organisations can use the insights for promotion campaigns aimed at increasing support for bird protection. Together with the leisure and tourism industry, nature organisations can develop meaningful and transformative experiences which improve awareness on the special nature values and bird protection in the Wadden Sea area, and which increase support for bird protection.

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# 60 Protected area labels as brands in tourism: insights from Germany

**Julius Arnegger[1,2], Bernd Eisenstein[1,2], Hubert Job[3], Manuel Woltering[3]**, [1]West Coast University of Applied Sciences, Germany. [2]DITF - German Institute for Tourism Research, Germany. [3]Julius-Maximilian University of Würzburg, Germany

Protected areas (PAs) are often major tourist attractions, notably in peripheral regions. Officially awarded designations, e.g. "national park", have been described as being important brands that can create unique selling propositions (USP) for destinations, distinguishing them from similar, but unlabeled landscapes (Arnegger, 2014). The PA label is seen as a guarantee for quality and authentic nature experiences. Officially designated PAs represent a scarce resource since official (national or international) labels are not easily, if at all, transferable and imitable (Hannemann & Job, 2003). It is often argued that certain designations, especially national parks and world heritage sites, have a superior brand identity compared to other, less-known labels such as biosphere reserves or nature parks (Reinius & Fredman, 2007; Job et al., 2005; Nolte, 2004). However, this argument appears to be based to a large degree on specific case studies and on-site surveys rather than on systematic image assessments of PA categories.

The present study addresses this research gap by evaluating the strengths of different PA categories as brands in tourism in a representative panel study for the German context. We focus on the three major large-scale PA categories as defined by the German Federal Law on Nature Conservation (BNatSchG): (a) national parks, (b) biosphere reserves and (c) nature parks ("Naturparke"), all of which can play, according to their legal mandate, important roles for tourism. In total there are 16 national parks, 18 biosphere reserves and 103 nature parks in Germany (BfN, 2021). In addition, we included the international (natural) UNESCO World Heritage category in the assessment. Currently there are three natural UNESCO World Heritage sites in Germany (UNESCO, 2021).

Generally, images in tourism contexts are formed through an individual's subjective interpretation of associations, thus consisting of cognitive, affective and conative (behavioral) dimensions which are hierarchically interrelated (Gartner, 1994, Eisenstein, 2018). The hierarchical order reflects the customer journey from awareness to behavioral intentions and is also referred to as marketing funnel (Morgan et al., 2012). Thus, we assessed the respondents' knowledge of and attitude toward different PA categories, as well as intentions to visit. In addition, respondents were asked about previous visits to the different PA categories. A quota sample (N=3,192) was recruited based on demographic and geographic criteria allowing for a representative survey for the German-speaking population. The survey was conducted in November 2020.

Results show differences between the individual categories of PAs: when asked in an open-ended question about PA categories they are familiar with, respondents most frequently mentioned nature conservation areas ("Naturschutzgebiete" - NSG). This finding is not surprising given that NSGs are ubiquitous in Germany (there are nearly 9,000 NSG) and important for many people's everyday outdoor recreation activities. However, they are generally small-scale (about 60% of NSG are less than 50 ha in size) and do not play major roles as tourist attractions or even destinations. In terms of unsupported awareness, NSGs are followed by the three large-scale PA categories mentioned above. Focusing just on these three types within this open question, a clear ranking can be seen: national parks are mentioned almost twice as often as nature parks and even three times as often as biosphere reserves. Additionally, natural World Heritage sites appear as a category in their own right, although comparatively few people mention them – suggesting they are not (yet) clearly present in the mindsets of German (potential) tourists.

When asked about the aided awareness of four PA categories in a multiple-choice question national parks were again the most well-known label, known to 78.6% of all respondents. They were followed by nature parks (64.6%), World Heritage sites (60.2%) and biosphere reserves (44.2%) (Figure 1).

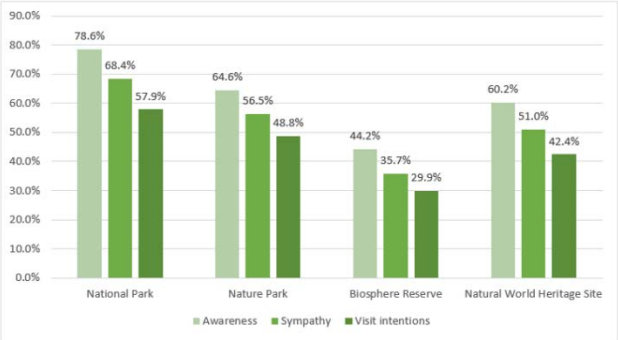


*Figure 1: Cognitive (awareness), affective (attitude/sympathy) and behavioral (visit intentions) image dimensions of PA labels in Germany (2020).*

Notably, conversion rates across the marketing funnel do not differ much across the four PA categories: between 80.8% and 87.4% of respondents who know a given PA category also state that they hold a positive attitude toward this PA label. Furthermore, between 83.1% and 86.5% of all respondents holding positive attitudes state that they will "probably" or "definitely" visit a PA of this category over the next three years.

Several conclusions can be drawn based on these results: as often stated in the literature, national parks represent the strongest brand among PA categories in Germany. This finding is hardly surprising given national parks' well-established image as PAs that guarantee rare and authentic wilderness experiences. However, it is remarkable that nature parks, which are numerous in Germany and could thus be expected not to be associated with genuine regional USP, are more popular than UNESCO World Heritage sites and biosphere reserves. The latter represent the least-known category; their explicit mission of providing pilot sites for sustainable development could make them, in theory, a suitable model for sustainable tourism promotion. However, biosphere reserves as PA category are also relatively young and thus not yet as well-known as national parks or nature parks; furthermore, they often have diverse regional development objectives, e.g. sustainable agriculture, among which tourism may only play a supporting role (Job et al., 2019).

Thus, the brand strengths of different PA labels do differ. However, these differences can be explained to a large degree by differences in awareness levels: respondents who know a specific PA label are also very likely to hold positive attitudes toward it, and to indicate visit intentions. Tourism marketing efforts under the central umbrella brand "National Natural Landscapes", as well as by PA managers and destination management organizations, should focus more strongly on awareness raising for the roles and key values of different PA categories.

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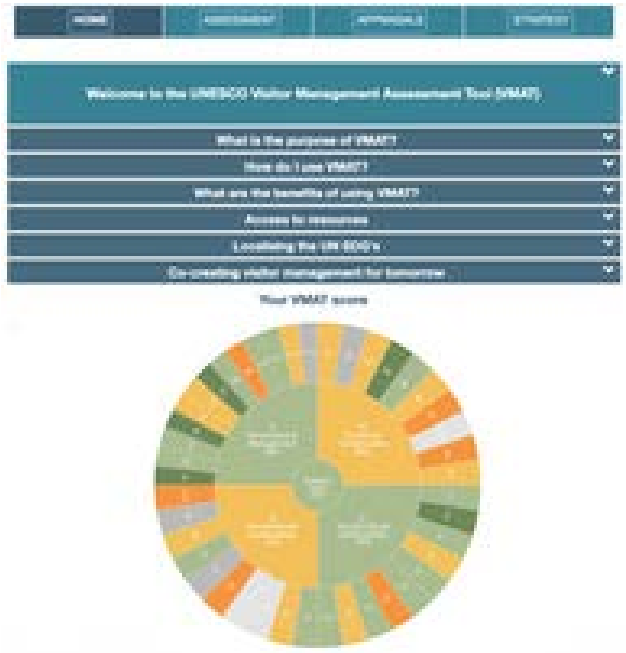
# 184 VMAST - the UNESCO World Heritage Visitor Management Assessment & Strategy Tool

**Cecilie Smith-Christensen**, World Heritage Catalysis, Norway. UNESCO World Heritage Centre, France

UNESCO designated areas, natural and cultural heritage including World Heritage sites, Biosphere Reserves and Global Geoparks are among the most visited places and attractions in the world. After a period of growth and challenges relating to visitor management and overtourism, the pandemic has demonstrated the vulnerability of tourism dependent communities. To 'build back better', we need tools and methodologies that help enhance adaptive and transformative capacity through a systems approach.

The UNESCO Visitor Management Assessment & Strategy Tool (VMAST), developed within the context of the UNESCO World Heritage Convention (1972) and set out through the UNESCO World Heritage Sustainable Tourism programme, is a new addition to the World Heritage Sustainable Tourism Toolkit. As a voluntary self-assessment tool, it helps site management authorities manage visitation and tourism for the protection of heritage values while localizing sustainable development goals.



The tool was developed with input from a broad spectre of stakeholders, including the Advisory Bodies (IUCN, ICOMOS, ICCROM), site managers and professionals working in the field of sustainable development and tourism. It aligns with the Operational Guidelines for Implementation of the Convention, the Periodic Reporting Tool, the UN Sustainable Development Goals, the Global Sustainable Tourism Criteria for Destinations (GSTC-D) among other relevant resources.

While many monitoring and management tools including certification systems focus on principles and what should be done at a minimum, VMAST recognise the many different efforts that can be considered good visitor management. VMAST allows the creation of a visitor management baseline encouraging improvements over time, considering best practice an ongoing process rather than status. As site management compare against their own baseline, sites managed under relatively low budgets may just as well demonstrate significant progress as compared to relatively resourced sites. As such, VMAST is designed to recognise and celebrate what is done and inspire continued efforts to improve and adjust visitor management according to resources and needs.

VMAST is used to assess achievements towards governance and visitor management with indicators structured under four main goals:

1. *Effective governance and visitor management protecting heritage values*
2. *Contribution to environmental sustainability, climate change mitigation and adaptation*
3. *Contribution to inclusive social development and cultural sustainability*
4. *Contribution to inclusive economic development*

Each of these goals include ten management objectives with approximately five target outcomes. With such a rich content, easing the user experience was an important consideration in its development.

Besides an assessment and monitoring functionality, VMAST also include an integrated strategy function allowing users to formulate building blocks for a SMART strategy and action plan.

*VMAST aims to improve practice across five management activities:*

**Monitoring -> Improved understanding**

Use VMAST to inform what could be done to improve protection of the sites heritage values while contributing to sustainable development objectives.

**Budgeted activities -> Feasible ambitions**

Use VMAST to budget for activities and support feasibility of strategic ambitions.

***Communication -> Improved outreach***

Use VMAST to effectively and in a culturally appropriate manner communicate with relevant stakeholders.

***Capacity development -> Strengthened capacities***

Use VMAST to engage with relevant stakeholders and strengthen capacities towards the achievements of identified sustainability and development objectives.

**Collaboration -> Increased impact**

Use VMAST as a framework to enhance engagement and dialogue with local and national authorities, rights-holders and other relevant stakeholders.

The presentation will focus on experiences from implementation the tool and user feedback. It will also focus on the potential for making use of VMAST beyond World Heritage.

# Protected area tourism: Benefits and community resilience in the age of over-tourism

| SESSION | PART | DATE | TIME | CHAIRS |
|---|---|---|---|---|
| 2F | - | Tuesday 17th August | 15.40 – 17.00 CET | Sandra Wall-Reinius & Marianna Strzelecka |

| | Programme |
|---|---|
| *2F* | **167** Second homes in the European Alps – strategies to reduce the significant land take |
| | **108** Enjoyed cultural services and perceived benefits through visitation to Chinese National Parks: A case study of Wuyishan Pilot |
| | **88** Heritage value and stakeholders' perception of four geomorphological landscapes in Southern Ice-land |
| | **49** Mental health: A cross-regional comparison between the East and West coast in Taiwan |

# 167 Second homes in the European Alps – strategies to reduce the significant land take

**Ulrike Pröbstl-Haider**[1], **Aurelia Kogler**[2], [1]University of natural resources and life sciences, Vienna, Austria. [2]FH Graubünden, Switzerland

Since several decades spatial planning in the alpine area tries to handle the ongoing enlargement of second home areas and the loss of landscape and natural resources. The negative consequences for the local population are well-known and consist of high property prices, limited space availability, gentrification and districts that are only alive on a few days a year. However, the demand is increasing since real estate can be purchased now by all persons which are inhabitants in the European Union. In addition real estate is known to be a safe investment for the future or for retirement. This trend is currently reinforced by low bank interest rates and the effects of the pandemic Covid 19.

The State of Salzburg serves as an example to illustrate the seriousness of the problem. Due to the mountains, only around one sixth of the area can be populated. In 2018 about 70% of the communities in the state of Salzburg are already subject to a second residence restriction. This is the case if the share of non-main residences is more than 16 percent. Tyrol, another heavily affected state in Austria, decided to introduce in 2020 an annual fee for second homes with payments per square meter. However the measures show little effects.

In contrast to similar development in other parts of the world the European market is still dominated by a significant demand for ***second homes*** ownership. Other opportunities such as buy-to-***let*** private rental housing or holiday ***homes*** to ***let*** are still unusual business models. These models require less space and provide socio-economic benefits for the local communities such as permanent occupation, an enhancement of the local tourism industry and the local gastronomy.

Against this background a survey will be presented analyzing the preferences of 480 respondents interested in holiday homes in Austria. The investigation is based on a choice experiment offering different opportunities to own a second home in the European Alps. This methodological approach is helpful in the context of complex issues, trade-offs between different development options and scenarios (Adamowicz et al., 1998, Pröbstl-Haider and Haider 2013, Pröbstl-Haider, Hunt, Haegeli and Rupf 2020). Also non-marketable attributes such as the landscape, hypothetical conditions or possibilities can be processed very well in an intuitively understandable form.

With this survey and the applied choice experiment we are able to understand influencing factors and the basis for decision-making. The results show that the number of rooms, the standard (3*,4*,5*), the price per square meter and the efforts for maintenance are all of high relevance for the overall decision making. The decision is also influenced by the possibility of a community tax. The type of the building, apartment house or single house or single house in a resort, are of less relevance as long they are all in a well-known tourism destination with many outdoor recreation opportunities. The size of the settlement and its population density are also of little importance. For the basic decision making the return and the usable time are also of minor relevance.

The presentation will show that about one third of the potential buyers is under no conditions interested in fractional or buy-and-let forms of ownership. This segment is also older than the average respondents. Younger respondents with less income can be attracted by fractional or buy-and-let. The precondition for them is that the standard should be high (4*) and exceed their actually affordable standard. Finally the presentation shows that community planning is also able to shift the preferences from the "classic second home" in favor of fractional and buy-and-let forms of ownership, if they consider these findings in the planning process.

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# 108 Enjoyed cultural services and perceived benefits through visitation to Chinese National Parks: A case study of Wuyishan Pilot

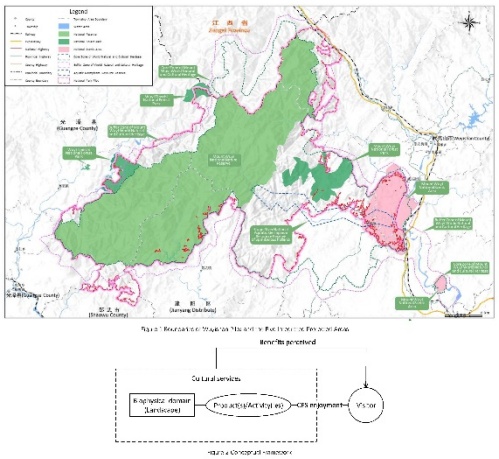
**Yefeng Xie[1,2], Bihu Wu[1], Linsheng Zhong[2]**, [1]College of Urban and Environmental Sciences, Peking University, China. [2]Institute of Geographic Sciences and Natural Resources Research, Chinese Academy of Sciences, China

## Introduction

A growing body of research reveals the important contribution that nature exposure and national parks and protected areas (NPPAs) make(s) to human health and well-being (Lemieux et al., 2012; Romagosa et al., 2015). According to the studies, NPPAs can contribute to people' mental health, psychological and physiological health, scientific/local knowledge accumulation and education, emotional improvement, transcendental experience, happiness, enjoyment, social network, reflection, self-actualization, personal growth, inspiration, quality of life, etc.

Meanwhile, cultural ecosystem service (CES) studies also draw wide attention. The ES framework was promoted by the United Nations to better understand relationships between ecosystem changes and human well-being development. And now, the framework is advocated by many researchers to be used as a decision-making tool to better govern and manage ecosystems and natural resources, and as well as to achieve human/citizen well-being. Scholars pointed out that CES and its contribution to psychological well-being is very important for visitor management (Willis, 2015); ES researchers also explored CES as beneficial outcomes of PA visitor activities (Roux et al., 2020). However, still few attentions were paid to the spatial distribution of visitor CES enjoyment and the corresponding benefit perception in a national park.

In China, many NPPAs have long histories and are homes of local residents. National parks are usually combinations of many different types of protected areas from the former PA system. For example, Wuyishan Pilot (designated in 2016), our study area, is integrated from five former different types of protected areas (Attachment figure 1), which are Wuyishan National Nature Reserve (1979), Wuyishan National Scenic and Historic Area (NSHA) (1982), Jiuqu River National Aquatic Germplasm Resource Reserve of Spinibarbus hollandi (2011), Wuyishan National Forest Park (2004) and Wuyi Tianchi National Forest Park (2013), and five other non-protected tourist resorts. Also, the national park area is largely overlapped with Mount Wuyi World Mixed Nature and Culture Heritage Site Area.



Meanwhile, traditional Chinese and modern global values make dual impacts on Chinese visitors. As traditional Chinese view of environment follows a tian ren he yi (the unity of man and heaven) philosophy, which guide most Chinese PA visitors' behaviors (Xu et al., 2014), outdoor recreation fashion also influences many other visitors. Their motivational differences and cultural divergences (Cui et al., 2015) can result in totally different national park visitation paradigms, and thus different CES enjoyment and benefits perceptions.

## Conceptual framework and research questions

According to literature review, a conceptual framework is as Attachment figure 2. CES enjoyment is a process composed by landscape enjoyment and product/activity consumption/performing, and through the enjoyment, visitors can perceive different benefits.

Thus, this study aims to investigate: a) what is the CES enjoyment in each zone of a Chinese national park; b) are there any differences between different zones of visitor enjoyed CES, and if yes, why do the differences occur according to the visitors and the zones' settings; c) what benefits do the visitors

perceive through their visitation and CES enjoyment, and how CES enjoyment relate to the benefit perceptions; and d) how different visitors' demographic characteristics (e.g., age, gender, education), cultural customs, and places of residence relate with their perceived benefits?

**Materials and Methods**

Data collection methods used in this study are: onsite observation (to answer question b), onsite visitor survey (a, b, c, d), online recreation track data and review data collection (a, b, c), and interviews with park managers (b).

Components of the questionnaire used for survey are: enjoyed CES options, which are adapted from frameworks put forward by Fish et al., (2016) and Haines-Young & Potschin (2017); perceived benefit scales, which are adapted from Croy et al. (2020), Fish et al. (2016), and Tuo et al. (2020); visitors' demographic characteristics, cultural customs, places of residence, and travel behaviors.

The most important data analysis methods are multivariate statistical analysis, GIS mapping, and content analysis.

**Results and further work**

From July 15, 2020 to September 1, 2020, we launched our first field work in the Pilot area, and collected onsite observation data and park managers interview data. Also, we collected detailed plan maps and protected area integration map (Attachment figure 1) of the area.

Preliminary results can be obtained. Firstly, in the Mount Wuyi National Scenic Area, cultural heritage is very important, and visitors mostly come for sightseeing. Also, in the surrounding areas within the Scenic Area, local residents visit for tea leisure; they pursue the tian ren he yi (the unity of man and heaven) status when enjoying tea on the top of the mountain. Secondly, in the Mount Wuyi National Nature Reserve, visitations are limited by the authority, because the area is the most outstanding area for biodiversity in south-east China and a refuge for a large number of ancient, relict species, many of them endemic to China. However, there are communities living alongside the county boundary, which is also a motorized way linking two provinces, so visitors come to the village for countryside experience together with high quality tea mountain sceneries.

Further and in-depth surveys and data collection need to be launched to answer the listed questions.

**Significance of the study**

Theoretically, this study could contribute to both ecosystem service field and park visitor management research.

Practically, China has a different context of protected area visitor management and monitoring with most Western countries, but also has similarities with East Asian countries and some other countries. Therefore, this study will not only be able to solve Chinese national park's practical management problems, but also provide insights to other parks under the similar background.

**References**

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# 88 Heritage value and stakeholders' perception of four geomorphological landscapes in Southern Iceland

**Jonathan Bussard**, Institute of Geography and Sustainability, University of Lausanne, Switzerland

Geomorphological heritage and landscapes have one common characteristic: their existence depends on a certain socio-cultural context and on the subjective view of different observers. Indeed, considering landforms or portions of land as heritage results from a process of "heritage making" ("patrimonialisation", Di Méo 2008): an object is considered as heritage when the values assigned by society or by some actors are sufficiently important to justify its preservation and transmission to future generations. From the perspective of geomorphologists, the central value of a landform is its geoscientific interest (Grandgirard 1997; Reynard 2004), i.e. its interest in understanding geomorphological processes, reconstructing the formation and the evolution of a landform, etc. The values that justify the heritage recognition of a landform may also be related to its beauty (aesthetic value), its cultural interest or its ecological value.

A geomorphological landscape refers to a landscape whose geomorphological component is of heritage interest. Some landscapes have gained international recognition for their geoscientific value, particularly the 93 sites included in the UNESCO World Heritage List that meet criterion viii – "to be outstanding examples representing major stages of earth's history, including the record of life, significant on-going geological processes in the development of landforms, or significant geomorphic or physiographic features". Obviously besides their scientific interest, most of these sites are also landscapes of particularly high aesthetic value.

As part a PhD thesis in progress (Bussard, in prep.), we first assessed the heritage value of four geomorphological landscapes in southern Iceland from a geomorphological perspective and, then, we conducted a series of interviews to see to what extent the heritage values assigned by different local stakeholders overlap with this assessment. The four geomorphological landscapes are Skaftafell Glacier, Laki craters, Torfajökull caldera in the vicinity of Landmannalaugar and Breiðamerkur Glacier and its proglacial margin, including Jökulsárlón.

The assessment of the heritage value showed that all four geomorphological landscapes have a high geoscientific value, related to their rarity, representativeness and paleogeographical interest. With only little impacts of human activities, these sites are almost intact. These sites are also spectacular and beautiful landscapes and have acquired a relevant cultural value because of the major impacts that volcanic eruption and glaciers advance had (and occasionally still have) on the local population. As a result of the development of tourism, these sites have come under increasing pressure, raising questions about the protection of their heritage value.

Twelve semi-structured interviews were conducted in August and September 2020. Four interviewees are from the tourism sector (tourism service providers, representative of a regional tourism office), four are managers of protected areas (national park and nature reserve), two are representatives of a geopark and two are mayors of local municipalities. Not surprisingly, the heritage awareness of managers of protected areas (Vatnajökull National Park, Fjallabak Nature Reserve and Katla Geopark) that include these geomorphological landscapes is high. The interviews also show that other types of stakeholders, such as tourism services providers, tourism promoters and representatives of local authorities, are also aware, to some extent, of the high geoscientific value. The establishment of Katla Geopark in 2010, the extension of Vatnajökull National Park to Breiðamerkursandur and Jökulsárlón in 2017 and the inscription of the park on the UNESCO World Heritage List in 2019 are evidence of a process of heritage making.

The societal and institutional recognition of the heritage value of these geomorphological landscapes is closely linked to their use as territorial resource for tourism, with the risks that the aesthetic aspects tend to mask the geoscientific value and that a more economic approach increases tensions between conservation and tourism development. The lack of appropriate management plans and infrastructure in several tourist sites, particularly in the

most accessible ones, due to the rapid increase of tourism activity since 2010, was pointed out by the majority of stakeholders as a major issue to ensure that tourism is compatible with landscape conservation. The ongoing elaboration of several management plans for protected areas and tourist sites will reveal the extent to which the heritage values of geomorphological landscapes are actually taken into account in relation to other interests and uses.

**References**

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# 49 Mental health: A cross-regional comparison between the East and West coast in Taiwan

**Chieh-Lu Li**, **Hung-Hua Chen**, National Dong Hwa University, Taiwan

Previous research showed that different types of landscapes and environments resulted in different mental health perceptions. Studies suggested that natural environments such as natural resources and protected areas were associated with people's health and wellness. Presence of nearby nature has effects on human both physically and psychologically, and improves people's mental health. People who are frequently exposed to natural environments tend to have better perceptions of mental health.

Taiwan has an area of 36,197 $km^2$. The area is about one-tenth of that of Norway. The mountain ranges occupy central part of Taiwan. This results in distinctive differences in the urban and rural settings between the west and east coasts of Taiwan, as there are obviously more natural resources and protected areas such as national parks on the east coast. However, there is only a small number of studies focusing on the cross-regional comparison of health and well-being related variables such as mental health. The purpose of this study was to investigate the mental health differences between residents on the east coast and residents on the west coast in Taiwan.

An on-site questionnaire survey was conducted on visitors and covered 3 settings, namely, Huisun National Forest Recreation area on the west coast of Taiwan and Chinan National Forest Recreation Area and Liyu Lake National Scenic Area on the east coast of Taiwan. The surveys were conducted in 2013, 2016 and 2017. 936 questionnaires were distributed and 760 valid copies were responded with a response rate of 81.1%. The visitors were grouped into those from the east coast and those from the west coast based on the zip code provided in the questionnaires. The data collected were analyzed using factor analysis, reliability analysis, multivariate analysis of variance (MANOVA), and analysis of covariance (ANCOVA).

The results are presented below: (1) the 21 mental health items were factorized into 4 dimensions, namely, physical and psychological fatigue, driving performance, attention fatigue and psychological comfort; (2) the 4 mental health dimensions' Cronbach's alpha reliability ranged from 0.73 and 0.91 with the physical and psychological fatigue dimension at the highest. The dimensions above provided acceptable validity and reliability for the purpose of the study; (3) the MANOVA with 4 mental health dimensions as dependent variable and visitor socioeconomics as independent variable revealed significant difference in gender, age, marriage status, occupation and residence, respectively. Visitors who were 41 years old or older, female, married, have a full-time job, retired, and lived in the east coast had better mental health; (4) when age and marriage variables were controlled for further analysis, the ANCOVA showed mental health differences remained cross-regionally. The east coast residents perceived lower rate in physical and psychological fatigue dimension of mental health (Table 1).

The findings were consistent to those of previous research, confirming the benefits of natural environments on mental health. The findings suggested that east coast residents in Taiwan have better mental health than those of west coast residents. Particularly, when the socioeconomic variables were controlled in comparison, the mental health differences remained cross-regionally. This study also provided management implications for mental health. We suggest that the authority should promote mental health benefits from natural environments, specific to residents of various socioeconomic backgrounds. For example, those who perceived less mental health such as younger age group can be placed as a priority. Additionally, since there were mental health differences between regions, the findings may serves as a basis for cross-regional tourism and recreation promotion such as long stay promotion on the east coast, as the east coast in Taiwan has obviously much more natural resources. The future research of this line is also provided.

*Table 1. ANCOVA result on cross-regional mental health differences in physical and psychological fatigue dimension by controlling age and marriage*

| **Controlled age** | **Mean** | **Standard Deviation** | **95% confidence interval** | |
|---|---|---|---|---|
| | | | Bottom | Top |
| **West coast** | 4.473 | .027 | 4.420 | 4.527 |
| **East coast** | 4.285 | .063 | 4.162 | 4.409 |
| **Controlled marriage** | **Mean** | **Standard Deviation** | **95% confidence interval** | |
| | | | Bottom | Top |
| **West coast** | 4.472 | .027 | 4.419 | 4.525 |
| **East coast** | 4.293 | .062 | 4.170 | 4.415 |

# Visitor monitoring, outdoor recreation, and education in water-based nature setting

| SESSION | PART | DATE | TIME | CHAIRS |
|---|---|---|---|---|
| 3A | I | Tuesday 17th August | 20.00 – 22.00 CET | Robert Burns |
| 6B | II | Wednesday 18th August | 20.00 – 22.00 CET | Danielle Schwarzmann |

| | Programme |
|---|---|
| *3A* | **18** Shifting setting densities and normative evaluations of crowding over time |
| | **34** Visitor satisfaction and crowding at the Florida Keys National Marine Sanctuary |
| | **144** Social media posts: An experience from Florida Keys National Marine Sanctuary, US |
| | **36** Estimating marine sanctuary public use: Preliminary results from a US National Marine Sanctuaries pilot project |
| *6B* | **155** Understanding recreation use at Florida Keys National Marine Sanctuary: A pilot study |
| | **173** Monitoring remote aquatic protected area use with remote methods during a pandemic: Innovation as necessity |
| | **175** Assessment of visitation patterns in Gray's Reef National Marine Sanctuary: An offshore aquatic protected area |

# 18 Shifting setting densities and normative evaluations of crowding over time

**Gerard Kyle**, Texas A&M University, USA

**Introduction**

In the United States, population growth and domestic migration is placing increasing pressure on natural landscapes and the array of ecosystem services they afford. The growth has given rise to the paradox of resource depletion through fragmentation and development while at the same time increasing the demand and need for these resources. In the context of publicly available nature-based recreation opportunities (e.g., protected areas, preserves, parks, lakes, rivers) lying near growing urban centers, the pressure can be particularly acute. Increased demand for these resources has led to ecological and social impacts. The diminished service quality increases human exposure to pollutants (e.g., water, air, noise), and stressors (e.g., conflict, crowding) within these environs. Given the array of psycho-social and physical benefits afforded by nature-based recreation opportunities, the depletion in service quality has potentially troubling implications for human wellbeing.

In the context of aquatic opportunities (e.g., rivers, lakes) concern is exacerbated by both the limited availability of accessible resource substitutes and limited capacity to acquire or develop additional resources. Vaske and Shelby's (2008) meta-analysis of social carrying capacity research conducted in the context of nature-based recreation resources illustrated that for boating as a general participation category, of the 66 investigations conducted in the 30 years leading up to their analyses, 20 percent of respondents considered the condition encountered "greatly over capacity" of the resource's ability to accommodate demand. When broken down into more specific aquatic categories, such as canoeing, those considering the resource demand "greatly over capacity" jumps to 50 percent. In this investigation, we document residents' perceptions of shifting use patterns of an aquatic nature-based resource situated within the Austin MSA – Lake Travis – over an eight-year period from 2008 to 2016. Specifically, we examine the drivers of residents' perceptions of setting density on the lake along with the cognitive and behavioral coping strategies they employ to maintain psychological homeostasis in conditions of rapid social and ecological change.

**Method**

The study population in this investigation consisted of shoreline property owners adjacent to an inland impoundment (lake) along the Lower Colorado River in central Texas. Data were collected from resident in 2008 and 2016. The protocols we adopted for the distribution of the mail surveys were adapted from Dillman's (2000) tailored design method. Following the 2008 and 2016 boating seasons (summer) in October, the identified residents were sent an initial letter informing them of the study and the opportunity to complete the survey online or to have a hard copy sent to them. Three follow-up contacts (survey packets) were made over the following four weeks. The procedures yielded 686 completed surveys (47.5% response rate) for 2008 and 730 in 2016 (44.3% response rate).

We included measures of residents' preferences for encounters with others on the lake, expectations for encountering others on the lake, their perceived crowding for the boating season, seven behavioral (absolute displacement, temporal displacement, activity substitution, resource substitution) and cognitive (rationalization, product shift, direct action). A model depicting their hypothesized relationships is depicted in Figure 1. This model was testing using data collected in both 2008 and 2016.

**Findings/Discussion**

While we saw no statistical mean difference in our measure of crowding in 2008 compared to 2016 crowding's normative antecedents (preference and expectation) and affective outcome (enjoyment) all varied over time. In 2016, respondents' preferences and expectations for encounters with others were both more than preferred or expected compared to 2008. Nevertheless, 2016 respondents reported a significantly more enjoyable boating season compared to those sampled at 2008. So how is it that when faced with a statistically more impactful stressor (2016 compared to 2008), the impact of that

stressor on an affective outcome is seemingly ameliorated over time? Our path modeling offers some insight. For our groups analysis (i.e., 2008 vs. 2016), we observed the direct and indirect effects of preference and crowding on enjoyment were significantly stronger in 2008. This was also true for their effect on the model's only mediator, temporal substitution. Collectively, the (negative) impact of these variables on enjoyment was significantly stronger 2008 resulting in diminished enjoyment when compared to 2016. This finding provides insight on the psychological drivers of normative evaluations of setting density and its affective outcomes. While mean comparisons over time reveal change (or not; Kuentzel & Heberlein, 2003; Vaske & Shelby, 2008), they provide little insight as to why; i.e., its psychological foundation. The heightened norm violation occurring in 2016 in terms of respondents' preference and expectation for encounters was significantly less salient in terms of its impact on respondents' enjoyment. 2008 respondents' felt need to adopt a coping strategy further suppressed their enjoyment.

While the effect of preference, expectation, and crowding on enjoyment was stronger in 2008 compared to 2016 for both data points, the effects were of the same valence and all had a deleterious influence on enjoyment. In studies that report crowding scores reflecting "over capacity" similar to our own (i.e., samples comprised of kayakers, boaters, and canoers), findings illustrate that aquatic recreational resources are under increasing pressure. Coupled with demands related to household, industrial, and agricultural use, the value of water (both cultural and economic) is further inflate). The paradox of increasing demand and a static supply of nature-based recreation resources points toward an emerging crisis. These data combined with very long history of past research implies that, owing to the fluidity of the normative basis of people's evaluations of setting density and behavior in natural settings, the social value of the resource and experience it affords is likely to remain steady with no loss in service provision. In a time of acute climate, social, and economic instability, the lens through which we view this past work is obscured by uncertainty and instability and casts doubt on the assumptions emanating from this extensive literature. While research on crowding in any context appears to have dissipated over the past 10 years, we feel that the social, environmental, and economic machinations of the past decade warrant renewed interest.

## 34 Visitor satisfaction and crowding at the Florida Keys National Marine Sanctuary

**Melissa Hurtado[1], Robert C. Burns[1], Ross G. Andrew[1], Danielle Schwarzmann[2], Jasmine Cardozo Moreira[3],**
[1]West Virginia University, USA. [2]NOAA Office of National Marine Sanctuaries, USA. [3]Ponta Grossa State University, Brazil

Understanding the human benefits and pressures on ocean and coastal environments is critical to keep managing these areas in a sustainable way. Outdoor recreation in marine protected areas has been increasing over the years. The increasing popularity of marine areas presents a paradox. On one hand, people seek to recreate in unique natural coastal environments with settings that match their needs and desires, and at the same time, millions of people depend on coral reefs and their income from tourism. On the other hand, the same increased recreational attention has resulted in negative impacts on the physical and social environment. Unfortunately, the literature indicates that sandy coastal areas are naturally more vulnerable to recreation impacts due to interactions between wind, waves and sediments. This is the main reason why an effective management and monitoring of visitor use is fundamental in marine protected areas. Carrying capacity is a term that emerged within the environmental and outdoor recreation fields of study and can be used as a potential management tool. A background on social carrying capacity leads to two important terms, which are satisfaction and crowding.

The primary purpose of this study is to examine the satisfaction and crowding of visitors at the Florida Keys National Marine Sanctuary. There are different variables that can influence overall satisfaction and crowding levels, this study will compare these variables across recreation users, such as snorkelers and divers, and other demographic variables in the Florida Keys National Marine Sanctuary. This study is part of a larger scale project called National Marine Sanctuaries Visitor Counting Process (NMS-COUNT) and it will be used to aid NOAA management decisions regarding visitor use in National Marine Sanctuaries. The Florida Keys National Marine Sanctuary (FKNMS) is part of the National Marine Sanctuary System and is administered by the National Oceanic and Atmospheric Administration (NOAA) Office of National Marine Sanctuaries (ONMS). It was designated on November 16, 1990 and it comprises 2,900 square nautical miles of waters. This sanctuary protects a coral barrier reef, extensive seagrass beds, mangrove-fringed islands, more than 6,000 species of marine life, as well as historical and archeological heritage such as shipwrecks.

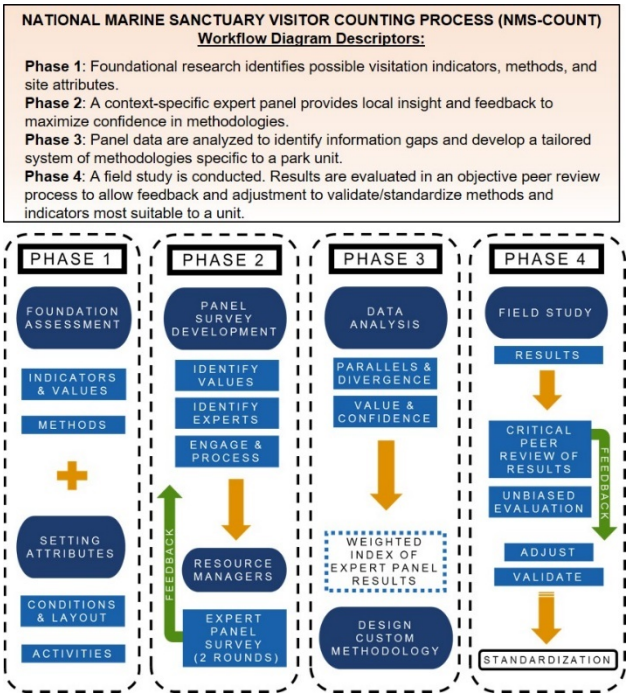
Online surveys were sent via Qualtrics to email addresses contacts of the Fishing License Database from the state of Florida during the summer of 2019 (n = 790). The total number of effective survey contacts was 1,986 and the total number of completed surveys was 790. The survey included questions related to visitor's satisfaction and crowding levels, expectation and performance, and basic socio-demographics. The survey instrument also sought information about the visitor's recreation patterns in the Florida Keys and intended to help managers understand important social, natural and economic information associated with these areas. It is clear that the FKNMS is a touristic destination that offers to the visitors several recreational activities such as world-class diving, swimming, snorkeling, and fishing. Therefore, an understanding combination of social and natural resource carrying capacity can help mangers to create better policies that will maximize human benefits from and minimize human pressures on ocean and coastal environments.

# 144 Social media posts: An experience from Florida Keys National Marine Sanctuary, US

**Jasmine Moreira[1], Robert Burns[2], Ross Andrew[2], Danielle Schwarzmann[3], Melissa Hurtado[2], Larissa Martins[1],**
[1]Ponta Grossa State University, Brazil. [2]West Virginia University, USA. [3]NOAA National Oceanic and Atmospheric Administration, USA

The US National Marine Sanctuaries' newly developed visitor estimation effort (NMS-COUNT, Figure 1) engages academics, agency scientists and managers in an iterative process to research and identify visitor estimation methods applicable to a specific site (NMS-COUNT, Burns et al, 2020). The NMS-COUNT process uses multiple different data sources to estimate visitation on water and along shorelines. Data sources include visitor interviews, traffic counts, satellite data, smart buoy data, and other technological methods. As a part of this study, social media was used to better understand perceptions and use by recreationists. The objective was to identify and analyze pictures posted by visitors that were geotagged with a specific location in Florida Keys National Marine Sanctuary. Researchers used screen scraping to collect the social media data for this study, searching for specific sites and popular reefs within the sanctuaries. Pictures that were geotagged were analyzed using four different social media platforms: Facebook, Google Maps, Instagram and Trip Advisor. Each method had advantages and disadvantages. Facebook and Google Maps were not able to be presented in chronological order. Trip Advisor comments were better if we want to analyze descriptive comments. Instagram allowed the researchers to search for specific sites by geolocation over a period of 2018, 2019, and 2020. Thus Instagram was the most effective method of meeting the objective of identifying the social media program that was the best fit for meeting the specific objective of estimate visitors from pictures posted online. Following this determination, data were analyzed according to the following steps:

Step 1: Collecting Raw Data: Using a hybrid approach, we located and quantified Instagram posts across time within focal location of interest. To analyze the pictures, we collected raw data and inserted the information in an Excel document containing fifteen columns. The columns were divided in four groups, basic information (user name, post number, date and the type of post whether this was recreational or not), if it was posted by a private user, by a business/recreational operator, or by NOAA, activity type (diving, snorkeling, fishing, general boating/others). The final group was categorized in three domains: landscape, services, and activities (according to the methodology of online reputation analysis created by Albach et al., 2018). After filling the columns of the Excel table, the data was analyzed in a summary table created for each of the 8 FKNMS sites. The data from each location will be combined and summarized to create a network of estimates that cover the entire study region.




Step 2: Adding Survey Data: Data from four separate questions from a larger survey instrument were merged with Instagram data to create numbers that estimate visitation. The respondents of this survey were contacts from the Florida Fishing License Database. The questions used were the following:
1) In a typical year, approximately how many days do you spend doing ocean recreation (activities that are in the water not including swimming very close to

shore) in Florida Keys National Marine Sanctuary? The result was a mean of 38.3 days.

2) How many days are spent on the following activities?

Mean = 24.8 # Days Private Fishing
Mean = 7.8 # Days Charter Fishing
Mean = 13.7 # Days Private Diving
Mean = 8.2 # Days Charter Diving
Mean = 12.9 # Days Snorkeling
Mean = 24.4 # Days General Boating
Mean = 17.0 # Days Other Activities

3) When you make a trip for ocean recreation, approximately what percentage of the time do you post about that trip on social media? The result was a mean of 20.6 % of time social media posting.

4) When you post about a recreation trip on social media, approximately what percentage of the time do you reference a location where the trip was taken? The result was a mean of 34.6 %.

Thus, the first and second questions were used to represent the number of days visitors spent on certain activities in a year. This information, along with the total number of days, was used to calculate a percentage of the days they spend on a certain activity. Then all of the data were extracted for the social media questions 3 and 4 (presented above) and researchers summarized the percentage of social media posting rates for each group. As a result, group posting rates were created that showed people in the diving groups post on social media on average 40% of the time. People in the fishing groups post on social media on average 16.7% of the time while people in the snorkeling group post on average 28% of the time. Finally, we identified that people in the general boating and other activities group post on average 23% of the time.

Step 3/4: Creating Visitation Count Estimations: We used the Instagram data of each site and the survey data from the group posting rate in order to calculate the number of trips for each category across each time period.

We repeated this process for each location across time periods and summarized the number of visits for each group at each site across each time period. The results of the visitor count estimations segmented by activity and location will be presented and discussed. It is important to note that the Instagram posts available were only public posts and the unavailable private ones were not included in the raw data.

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# 36 Estimating marine sanctuary public use: Preliminary results from a US National Marine Sanctuaries pilot project

**Robert C. Burns**[1], **Ross Andrew**[1], **Danielle Schwarzmann**[2], **Jasmine Moreira**[3], [1]West Virginia University, USA. [2]NOAA National Marine Sanctuaries, USA. [3]Ponta Grossa State University, Brazil

The U.S. contains over 172,481 square miles of underwater parks designated as National Marine Sanctuaries (NMS). They serve as a bridge to natural resource exploration, education, recreation, tourism, and offer many other ecosystem services for both U.S. citizens and foreign visitors alike. Visitors to these areas number in the millions each year and account for significant economic production within, and adjacent to, these areas as well. Despite the popularity and importance of these areas on the whole, a knowledge gap exists with respect to visitor use and monitoring in areas of specific aquatic orientation. Visitor use can be profoundly productive in terms of economic activity. Therefore, the National Marine Sanctuary System is critical in supporting vast production of economic activity each year. With their unique resources, National Marine Sanctuaries attract large numbers of visitors every year and may serve as primary economic drivers for surrounding communities. However, specific visitor use counting and monitoring methods are not standardized or properly applicable to specific marine sanctuary sites. A better understanding of visitor use patterns and motivations at specific marine sanctuary sites would increase the capacity for economic growth and sustainability of valuable ecosystem services in these areas. Marine sanctuaries and parks inherently have porous borders, and multiple access points may make counting as a means to arrive at visitation estimates a challenging approach. The National Marine Sanctuaries Visitor Counting Process (NMS-COUNT) offers an iterative framework to address this knowledge gap while involving key stakeholders throughout the process. In this way, communication among managers and researchers is incorporated to help develop and implement the most efficient methodology for a particular aquatic area.

NMS-COUNT engages academics, agency scientists and managers in an iterative process of four phases: 1) research and identification of visitor estimation methods applicable to a specific site, 2) expert panel to provide input on site-specific methods, use indicators (social, environmental, temporal, spatial intensity, etc.), and confidence levels, 3) development of a site-specific methodology and sampling plan, and 4) field testing and analysis (Figure 1). In each phase, methods are analyzed for confidence in producing visitor estimates that are efficient, valid, and reliable, and adapted via feedback throughout each successive iteration. Iterations between the three phases ultimately result in a scientific consensus on quantitative goals for measuring visitor use at an agreed upon level of confidence.

In Phase 1, academic researchers review the literature for a comprehensive understanding of methods in visitor sampling, estimation, and monitoring in a range of settings. From this research, potential methods and the types of data they produce are identified, as well as the advantages and disadvantages of using each method at different scales. To examine which methods and indicators of visitor use are most effective in a chosen National Marine Sanctuary, all attributes, visitor activities, and conditions (social, biophysical, regulatory, spatial, and temporal, etc.) of the Sanctuary are inventoried. Researchers then determine which methods are potentially appropriate for that particular Sanctuary, at a range of confidence levels (low to high).

Phase 2 brings together various agency managers, local stakeholders, and researchers to address a set of management objectives and associated monitoring needs. In this collaborative process, all stakeholders contribute their knowledge, perspectives, and legal mandates that guide work within a specific Sanctuary. Managers and scientists participate in a series of surveys/workshops that progress from a more broadly-based questionnaire to one with more specific questions based upon prior feedback. The expert panel discusses visitor trends and challenges specific to monitoring visitation in their Sanctuary. The results of each iterative survey and workshop provide detailed insight into the current state of knowledge on visitation and level of confidence in the ways this information has been obtained.

In Phase 3, data from expert panel input are analyzed and gaps are identified. A methodology is designed specific to the Sanctuary based on this analysis. In Phase 4, a field study tests the methodology and performance of measures. The results of the study and all phases will be used to validate and standardize methods, and to advance development of visitation indicators and models.

Understanding visitation to a marine sanctuary or park is one of the first steps to accurately estimating associated benefits and economic contributions. Furthermore, a robust process to reliably estimate general visitation may reveal useful trends within other strata of visitation or spatial hotspots which require additional monitoring. Sanctuaries may be located along shorelines or they may lack a physical boundary when located offshore. This diversity of geographic locations results in unique challenges to counting visitors, especially when data collection must be cost-effective. NMS-COUNT offers a solution to these challenges, built upon the best available science and localized input.

# 155 Understanding recreation use at Florida Keys National Marine Sanctuary: A pilot study

**Danielle Schwarzmann[1]**, **Robert Burns[2]**, **Ross Andrew[2]**, [1]NOAA/ONMS, USA. [2]West Virginia University, USA

NOAA's Office of National Marine Sanctuaries has a long history of understanding economic expenditures in and near sanctuary settings. Users use can be profoundly productive in terms of economic activity. Many studies have documented the linkage between users use and economic gain for particular areas. A 2016 study conducted by the Department of Commerce determined the gross value of recreational fishing and boating at approximately $38 billion. Concurrently, the National Marine Sanctuary System (NMS) is estimated to support several billion dollars of economic activity each year. Nationwide, the National Marine Sanctuary system attract millions of users every year and serve as primary economic drivers in many communities. A better understanding of users' use patterns and motivations would certainly increase the capacity for sustainable use and preservation of ecosystem services in these areas.

The National Marine Sanctuaries Users Counting Process (NMS-COUNT) is a methodology being used to understand user expenditures at Florida Keys National Marine Sanctuary (FKNMS) during the 2020/21 timeframe. Field sampling was originally scheduled for spring and summer 2020, relying on a variety of data collection techniques including in-person surveys and point counts of users. However, the recent development and spread of novel coronavirus COVID-19 within the U.S. and around the world has caused disruptions in travel and everyday life, including research activities.

The NMS-Count process consists of four phases (Phase 1 Discovery, Phase 2 Develop, Phase 3 Design, and Page 4 Determine the amount and type of use and economic expenditures). Focusing on phase 1 and 2 of the NMS-COUNT process was necessary in order to develop survey instruments for the process. Phase 1 consisted of a foundation assessment and the creation of a literature review that were the point of departure for phase 2. This second phase consisted of a panel survey development that engaged local resource managers and had two rounds of an expel panel survey. In phase 3, a custom methodology was designed, which also included the design and development of the survey instruments. Phase 4 is still an ongoing process. Several survey instruments were developed for the monitoring effort. The surveys asked questions about visitation patterns, trip characteristics, expenditures, location information, conditions that influence recreation, among others.

Results

Results showed that in a typical year, users reported spending an average of 31 days participating in ocean recreation-related activities in FKNMS and an average of 19 days traveling offshore for any activity more than 3 miles. They also reported that in a typical year they visit 21 days on average the FKNMS and have approximately 4 people on average in their groups when fishing, 4 people when general boating, 4 when snorkeling and 3 when diving at the sanctuary. In the economic section users were asked to select the amount of money they use in each activity for a single trip in Florida Keys National Marine Sanctuary, the results showed that users spend on average $260.11 on fishing and $166.74 on general boating, approximately $106.71 diving and $65.64 snorkeling. The users reported the estimated total individual spending of their group on a typical visit/trip to the Florida Keys in different locations. The highest average amount of expenditures was in Islamorada/Upper Matecumbe Key area with $690.12. Key Largo had an average expenditure of $296.68 and users also reported they spent on average $374.67 in other locations. Lodging ($869.21), food at restaurants ($405.71) and fees for charter fishing ($398.01) are the categories with the highest averages of expenditure for a typical visit to the Florida Keys. The average amount of expenditures that users spend during the summer is $1124.39, while fall ($670.01) was considered the season when users spend less money during their trip in the Florida Keys. Users were asked how much money in total they would individually spend on a typical trip to

Florida Keys National Marine Sanctuary. Users reported they spend an average of $1744.54.

# 173 Monitoring remote aquatic protected area use with remote methods during a pandemic: Innovation as necessity

**Ross Andrew[1]**, **Robert Burns[1]**, **Angela Hentz[1]**, **Danielle Schwarzmann[2]**, [1]West Virginia University, USA. [2]NOAA Office of National Marine Sanctuaries, USA

Monitoring outdoor recreation and use in remote aquatic areas presents challenges beyond traditional sampling and methodologies. A diversity of entry points and mechanisms, coupled with diffuse pathways to enter such areas makes assessment of use especially sensitive to bias and limitations of methods. Also, the unique attributes of protected areas make use assessment and monitoring an inherently customizable problem. To address these challenges, an iterative process that incorporates local expert knowledge to prioritize methods that balance accuracy and efficiency is preferred. One such process, called NMS-COUNT (Burns et al. 2020) has been developed to address use monitoring at National Marine Sanctuaries within the United States. This process seeks to apply a standardized assessment of potential methods through extensive literature review (Andrew et al. 2021) and expert panel feedback to arrive at a customized formula of methods suitable for context-specific protected areas. This method was applied to two pilot study sites using data from 2019-2020 in Gray's Reef National Marine Sanctuary and Florida Keys National Marine Sanctuary in the southeastern U.S. During the development phase of the process, mixed methods were prioritized, including the use of in-person surveys and counting. As the design phase progressed and was ready for implementation, the COVID-19 pandemic emerged as an even greater challenge to human use sampling and monitoring.

Restrictions imposed by the COVID-19 pandemic interrupted field work, travel, and other in-person methods proposed in the pilot studies. Due to these issues and influence of such lockdowns, innovative ways of collecting useful data without direct contact interactions were necessary. Survey methods were adjusted from intercept based targets to fully online versions. The use of such web surveys creates challenges for survey methodologists therefore, it is important to keep in mind the most desirable online surveying practices and the four traditional sources of survey errors – sampling, coverage, measurement and nonresponse (Dillman, & Bowker 2001). Some of the benefits that an online interview can provide to the interviewers during COVID-19 include 1) being comfortable, non-intrusive and safe; 2) engaging and convenient; 3) online communication ease and easy set-up. On the other hand, some of the limitations include lack of non-verbal communication, poor set-up, and privacy and access issues (Dodds & Hess, 2020). These factors were considered as the remote survey methods were applied to pilot study sites using contacts obtained through recreational providers and state agencies. Thousands of contacts were obtained, and subsets were created to distribute multiple surveys.

Over 3,200 survey responses were collected over a period of contact and data collection in spring and summer 2020. Contacts were addressed following Dillman & Bowker (2001) recommendations of personalization and follow-up procedures to maximize engagement and response rate. Mean effective response rate across survey instruments and locations was 69.1%, and survey responses covered a range of topics related to visitation frequency, group size, duration of use, seasonality of use, motivations, demographics, and basic economics of use. Survey results were used within an analysis framework that was mutli-faceted. First, survey results were used in self-contained analyses that provide estimates of visitor use patterns and group dynamics. Second, survey data were used to supplement other remote methods that help inform visitor use in a more simplified count-based process. This integration provided results that transcend what is possible with survey methods or remote sensing data alone.

The integration of survey data with remote methods such as satellite imagery, automated vessel identification, and crowd sourced data from social media allowed estimation of visitor counts using activity type, groups sizes stratified by activity and vessel type/size, and economic value of activities at given locations and time periods. For example, automated vessel identification information for location

and time period was used along with vessel size to determine the approximate amount of people per vessel using survey derived estimates that respondents listed based upon vessel size and activity for typical group size. Furthermore, based upon group size and mean expenditures for a single trip in a given activity collected in the survey data, estimates of economic value of activities in a particular time and location are demonstrated. Survey questions asking visitors about the frequency of social media usage were coupled with posting magnitude for locations of interest to create stronger estimates than crowd sourced social data would alone. Finally, methods such as satellite imagery and automated vessel identification were compared against each other to assess gaps between them in specific time and space intervals.

Using a portfolio approach to remote methods, driven by necessity in the pandemic, allowed deeper understanding of methods that may be integrated to produce stronger results than one or two could alone. With respect to monitoring visitation in an increasingly technology-drive world, this approach offers impressive efficiency once methods are established and validated. Sourcing data is a major driver of such analytical approaches, and may replace costs typically associated with more intensive field operations for data collection. However, in the research environment shaped by the limits of the pandemic, these findings illustrate what is possible with limited contact, field time, and sampling budgets for monitoring visitation in the modern world.

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# 175 Assessment of visitation patterns in Gray's Reef National Marine Sanctuary: An offshore aquatic protected area

**Marieke J. Lemmen**[1], **Robert C. Burns**[1], **Ross G. Andrew**[1], **Danielle Schwarzmann**[2], [1]West Virginia University, USA. [2]NOAA Office of National Marine Sanctuaries, USA

The United States includes over 600,000 square miles of underwater parks designated as National Marine Sanctuaries (NMS). These areas often serve as a popular destination for natural resource exploration, recreation, tourism, and they offer many other ecosystem services. Understanding visitor use is fundamental for engaging and improving management in protected areas. As part of a larger scale project, named NMS-COUNT, which is developing a methodology to estimate the number of visitors in National Marine Sanctuaries, two questionnaires were distributed to potential visitors of Gray's Reef National Marine Sanctuary (GRNMS) and surrounding coastal Georgia. The first survey instrument was focused on visitation and trip characteristics and the second one was focused on economics. Both questionnaires included questions about the participants' demographics, trip characteristics, recreation activities and the location of GRNMS as well as departure points, the most visited location of coastal Georgia and departure points for ocean recreation trips. Participants were asked to indicate the locations on separate heat maps. The sample size of this study was 1,650 effective survey contacts, with a response rate of 50.7 %.

The results show that a large majority (80% and more) of the participants were US- residents, male, and white. The average age of the visitors was 55 years old. A large majority (86%) of respondents indicated relatively high education levels, with at least "some college" education or more. Approximately half (49%) of respondents indicated their annual household incomes over $100,001. In a typical year, respondents reported spending an average of 37 days doing ocean recreation in and around coastal Georgia, an average of 8 days traveling offshore for any activity more than 3 miles, and they visited Gray's Reef National Marine Sanctuary 3 days on average. During a trip for ocean recreation in the focal area the main activities indicated were Private Fishing and General Boating and participants were going in groups of in average 4 persons overall. Participating in their indicated main activity, the visitors spend on average $156.51 on fishing and $84.67 on general boating for a single trip, which also represents the highest costs per activity. Respondents indicated highest levels of spending on lodging ($373.83), food at restaurants ($188.98), and charter/party boat fishing fees ($176.30) for a typical visit to the coastal Georgia area. Additionally, the respondents indicated the average amount of $129 as the total cost for a typical trip to GRNMS across all activity types. Respondents indicated their most frequently used departure points to travel into the ocean for recreation, which were coastal areas surrounding Brunswick, GA, Shellman Bluff, GA, and Savannah, GA. However, the results showed that the majority of respondents (57%) were not familiar with the location of GRNMS. Visitor profiles were further examined across these groups of GRNMS awareness levels, to explore visitor dynamics of those aware of the Sanctuary and those unaware of the Sanctuary. Weather and ocean conditions were indicated as the most important factors influencing the visitors motivation and decision to make a trip to GRNMS or any ocean recreation.

The collected data can help to inform and create science based policies and decisions that better serve the visitors desires and needs. To improve the management of the ecosystem and their carrying capacity including sustainability it is important to understand visitation and its social, ecological and economic impacts. Management helps conserving the (vulnerable) reef by adapting policies to new insights regarding the area and their visitors. Consistent monitoring in areas in the ocean is very challenging due to lacking entry gates, visible area boundaries, roads, or other infrastructural facilities to potentially count traffic or intercept visitors for surveying. Therefore, adaptive data collection that identifies visitor patterns without intensive field sampling in diffuse locations is beneficial. In addition to the survey data collected, it is also helpful for visitor number estimation to include comparisons and analyses of

covariate information, such as AIS data, indirect counts obtained through social media post analyses, remote sensing, and buoy data.

Predicting and analyzing human behavior is very complex. Nevertheless, addressing people's perceptions of use in such remote aquatic areas can lead to insights about the status of an ecosystem, besides the usual ecological monitoring. Due to the COVID-19 pandemic on site surveys were not possible as initially planned. For more valuable data it could be useful to conduct on site traffic data, onsite observations and on site interviews. Additionally, the methods used here may be applicable to other aquatic visitation monitoring, assuming the capacity for data sources exists. Results derived from remote surveys are subject to bias associated with recall of activities, locations, and timing of use. However, in settings that are offshore, interception of visitors at the time of use maybe have low likelihood of success. Therefore, the survey methods and results obtained here provide an effective way to collect data in such visitation settings that may otherwise be challenging across space and time.

# Combining social media and ubiquitous data with traditional recreation monitoring to address emerging questions in the Anthropocene

| SESSION | PART | DATE | TIME | CHAIRS |
|---|---|---|---|---|
| 3D | - | Tuesday 17th August | 20.00 – 22.00 CET | Don English |

| | Programme |
|---|---|
| *3D* | **64** Listening to public debate on Twitter about parks and other natural areas |
| | **141** Landscape-scale insights into recreational activities derived from social media content |
| | **77** Exploring human–nature interactions in national parks with social media photographs and computer vision |
| | **96** Potential contributions of crowd-sourced data in public lands recreation monitoring systems |

# 64 Listening to public debate on Twitter about parks and other natural areas

**Catherine Pickering**, **Patrick Norman**, Griffith University, Australia

## Introduction

Increasingly those monitoring and managing natural areas are interested to know what people talk about in relation to these landscapes and tourism and recreation activities within them. But obtaining such data can be challenging with methods such as surveys, focus groups, interviews and others limited in scale and time due to logistical and financial constraints. With increasing debate occurring online about a wide range of issues, it is increasingly possible to listen into such discussions to monitor who talks about what places and issues and how they feel about them, as well as monitor responses to specific events (Norman, 2020). Park agencies, governments and tourism operators are already using popular social media platforms, such as Facebook, Twitter and Instagram, to communicate with visitors and others about issues relating to visitation such as natural disasters, social unrest, the closure of parks, trails, roads or other facilities, as well as the promotion of specific events and activities. Some platforms, such as Twitter, also provide the opportunity to not only listen to people's responses to what organizations post, but also monitor more general conversations about a wide range of relevant issues in the form of 280 character tweets posted to the platform (Norman, 2020; Teles da Mota and Pickering, 2020).

Here we review some of the benefits and limitations when using Twitter to monitor public debate about natural landscapes and visitation highlighted in a range of recent papers and projects.

## Methods

Data from Twitter can be obtained using Automated Programming Interfaces (API). Twitter provides official tools to access tweets and associated metadata through programming languages including Python, Ruby and JavaScript, and there are community options created to allow easier access including the TAGS for Twitter Google sheet template (Norman, 2020). Due to the large amount of metadata returned when assessing Twitter, relational databases, such as SQLite, PostgreSQL or MySQL, are often required to store and filter tweets. Once obtained, tweets require cleaning and processing to extract usable information with programing languages such as R and Python providing useful tools, although for smaller data sets Excel can be used. For example, metadata can be analyzed to obtain geocoded user locations, while topics, locations, sentiments and emotions in the text of the tweet can be coded, analyzed and visualized using these programs (Norman, 2020; Pickering and Norman, 2020; Bhatt and Pickering, 2021; Mangachena and Pickering, 2021).


*Figure 1: Some of the benefits and limitations of using Twitter data when listening to public debate about protected areas.*

## Results and Discussion

We and others have used these types of approaches to assess discourse about national parks finding many benefits from such analysis (Figure 1). This included comparing millions of tweets sent globally about national parks where we assessed which parks dominated the conversation and who talked about them from which countries (Norman, 2020). The results highlighted the scale of the discourse, but also how it was dominated by people from countries such as the USA and Europe and was predominantly focused on just a relatively few parks. Research looking across parks within countries (Bhatt and Pickering, 2021; Mangachena and Pickering, 2021) found that what is talked about varies both among parks, but also among people with some differences between nationals and internationals. Studies in single parks also found differences between national and internationals and highlighted how some issues are

specific to a place and time (Pickering and Norman, 2020). The tweets about parks often talk about issues such as conservation, management of mammals, visitation, safety, specific events, landscape features, activities, and biodiversity, among others. Research is also starting to examine differences in what is discussed in English and other languages, how people respond to issues such as COVID-19, park closures and other changes. These studies have also highlighted the potential readership of the tweets with many of those posting about parks with millions of followers, particularly news and conservation organizations.

The results of the different studies have also highlighted a range of limitations with the use of such data (Figure 1) including the absence of many voices from the discourse, including many park visitors, people from many countries, and certain groups/demographics within countries including those living in or close to the parks. Interpreting the content of the tweets can also be challenging due to the short nature of the tweets and issues with literal interpretations of the meaning of text when those writing and reading them may see other meanings. In some cases, the relative popularity of parks on Twitter is similar to actual visitation (Norman, 2020), but not in other cases (Bhatt and Pickering, 2021). Engagement with many issues and places was fleeting or missing entirely and there are increasing restrictions on access to data from Twitter and other platforms. Finally, there are important ethical and privacy issues that need to be followed in using this and other social/human data.

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## 141 Landscape-scale insights into recreational activities derived from social media content

**Spencer Wood**[1], **Heera Lee**[2], **Emmi Lia**[1], **Lesley Miller**[1], **Bumsuk Seo**[2], **Eric White**[3], **Sama Winder**[1], [1]University of Washington, USA. [2]Karlsruhe Institute of Technology, Germany. [3]US Forest Service, USA

Volunteered geographic information, such as social media and online trip reports, are a promising source of data on the amount and character of recreational use in parks and protected areas. The volume of data is often correlated with on-site measures of park visitation, and the content contains rich descriptions of visitors' experiences. This study presents a novel and generalizable model of public land visitation based on posts to three online social media platforms and two trip reporting platforms from National Forests in Washington, USA. Then, we introduce and apply a convolutional neural network model for accurately classifying these visitors' activities, based on the content of the social media. We find that social media can substantially improve estimates of visitation to public lands. Furthermore, there is also a strong correlation between the number of survey respondents reporting their participation in 14 common recreational activities and the number of social media posts classified as pertaining to the same activity. The models perform nearly as well in novel locations as in the primary location, suggesting that the approaches are broadly applicable, though performance varies by activity. By comparing our maps of recreational participation to the underlying landscape, we find that natural features (such as rivers, lakes, and higher elevations) and some built infrastructure (campgrounds, trails, roads) support a greater diversity of activities, while visitors are less sensitive to features such as picnic areas and wilderness designation. Even while respecting the limitations of the volunteered data and models, these results provide actionable information to land managers by illuminating how recreation varies spatially and according to the recreational activities that are provided.

# 77 Exploring human–nature interactions in national parks with social media photographs and computer vision

**Tuomas Väisänen**[1,2], **Vuokko Heikinheimo**[1,2], **Tuomo Hiippala**[1,3,2], **Tuuli Toivonen**[1,2,4], [1]Digital Geography Lab, Department of Geosciences and Geography, University of Helsinki, Finland. [2]Helsinki Institute of Sustainability Science, University of Helsinki, Finland. [3]Department of Languages, University of Helsinki, Finland. [4]Conservation Science Group, University of Cambridge, United Kingdom

Understanding the activities and preferences of visitors is crucial for managing protected areas and planning conservation strategies. User-generated geographic information such as photographs shared on social media have emerged as new data sources to complement more traditional visitor information such as on-site surveys. However, analyzing large volumes of photographs manually is a laborious task. Automated analysis of the rich textual and visual content on social media data offers new opportunities for understanding human presence and activities in nature (Toivonen et al. 2019). Approaches for textual and content analysis have been widely developed under the umbrella of 'conservation culturomics' (Ladle et al. 2016). They have been recognized as a useful data source for nature conservation. At the same time, automated analysis visual content has remained rather underexplored when mapping human activities in nature.

In this presentation we present our findings of using computer vision methods to explore human-nature interactions from social media photographs and their applicability to visitor monitoring of protected areas. Our main questions are: What types of information can off-the-shelf computer vision methods extract from social media photographs, in terms of activities and preferences of people? Do different visitor groups share different types of photographs from national parks? How does photographic content vary between different types of national parks?

To answer these questions, we collected geotagged Flickr data from the 20 most popular national parks in Finland measured based on Flickr data. We classified the users into national and international visitors based on available profile information. We examined the application of three state-of-the-art computer-vision methods to studying human–nature interactions, namely semantic clustering, scene classification, and instance-level object detection, and evaluated their applicability to visitor monitoring of protected areas. Semantic clustering enabled us to get a general overview of the semantic structure and visual themes of all photographs. Scene classification enabled us to understand landscape preferences across the visitor groups and national parks, while instance-level object detection enabled us to understand what the activity preferences of the visitor groups are.

Our results show that human–nature interactions can be extracted from user-generated photographs with computer vision. Photographic content differed between domestic and international visitors, which indicates differences in activities and preferences. Semantic clustering revealed broad visual themes in the visual data set as a whole and distinct visual content is shared from different landscape regions and by visitor groups (see Figure 1). Scene classification results show how international visitors prefer wintery and touristic landscapes, while domestic visitors enjoy scenes relating to summery forests and autumn colors. Instance-level object detection revealed several objects associated with activities such as bicycles, skis, and backpacks. Based on the detected objects we found bicycle and dog sleigh riding more popular with international visitors, while domestic visitors shared more cross-country skiing, orienteering and pet dog pictures. As with all social media data sources, the Flickr data contains biases. For instance, we identified 79% of the users as male, and only 10% as female.

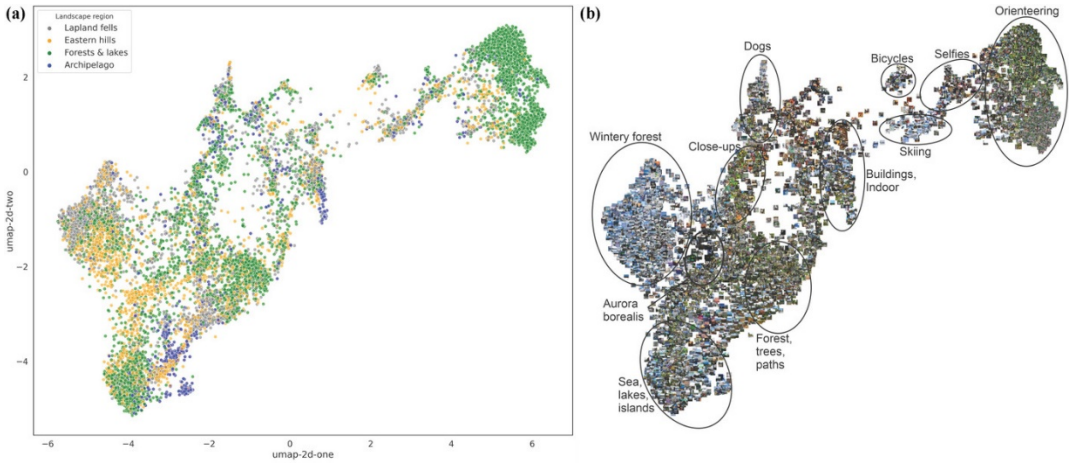


*Figure 1. Semantic clustering of Flickr photos placed in UMAP (unifom manifold approximation and projection)-plots (a) as dots color-coded by their landscape regions (images similar in their vector representation are placed close to each other) and (b) as thumbnails and ellipses delineating clusters of similar photo content (labeled by the authors after visual examination).*

The different methods complement each other by revealing broad visual themes related to level of the data set, landscape photogeneity, and human activities. The results partly confirm previous insights from visitor surveys, but also provide a completely new level of detail at various geographical scales and temporal resolutions such as emerging and event-type activities. Geotagged photographs revealed distinct regional profiles for national parks (e.g., preferences in landscapes and activities), which are potentially useful in park management and conservation marketing.

Information extracted automatically from photographs can help identify preferences among diverse visitor groups, which can be used to create profiles of national parks for conservation marketing and to support conservation strategies that rely on public acceptance. Considering high costs involved with traditional visitor surveying, our positive experiences suggest that these methods may considerably improve understanding of visits to protected areas and human–nature interaction in general, particularly in areas where detailed monitoring of visitors is not feasible. The application of computer-vision methods to automatic content analysis of photographs should be explored further in conservation science, particularly in combination with rich metadata available on social media platforms.

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## 96 Potential contributions of crowd-sourced data in public lands recreation monitoring systems

**Donald English**, **Eric White**, USDA Forest Service, USA

Data on recreation use and visitor patterns are critical for information decisions about recreation management and policy. In the U.S., the recreation monitoring systems used by the federal public land agencies rely almost exclusively on traditional tools and approaches (Leggett et al. 2017). Specifically, U.S. federal agencies commonly combine permanent and temporary traffic counters with on-site visitor surveying to measure the amount of recreation use and visitor characteristics. Of the federal agency recreation monitoring programs, the National Visitor Use Monitoring (NVUM) Program used by the United States Forest Service is viewed as the most comprehensive. Recreation practitioners and policymakers have raised the potential for using crowd-sourced and online information posted by visitors in place of, or as supplement to, traditional recreation monitoring programs. We have found that crowd-sourced data, including social media posts, are well correlated with official NVUM use estimates across a range of spatial resolutions (Fisher et al. 2018, Wood et al. 2020). Further, Wood et al. found that models could be used to directly estimate the amount of recreation use, even at previously unstudied sites. However, that study also found that models developed using social media data worked best when they incorporated some on-the-ground counts gathered using traditional approaches. In this presentation, we describe opportunities to use crowd sourced data to complement the National Visitor Use Monitoring Program. First, crowd-sourced data offers the ability to infer patterns in recreation use at individual sites. The NVUM sampling program is not designed to provide recreation use estimates for individual sites and crowd sourced data offers promise to fill in this gap. Second, the NVUM program only provides results for individual forests every five years. By identifying relationships between the crowd-sourced data and the NVUM data collected in the on-the-ground sample year, we can develop an estimate of recreation use trends in the years between NVUM sample estimates using crowd-sourced data. Finally, the NVUM sample is drawn from a population of recreation site days characterized by field managers. This characterization can be difficult for managers because it requires knowledge of fine-scale temporal patterns in recreation use at individual sites. We believe that crowd-sourced data can be used to assist in describing those temporal trends, potentially improving the accuracy in characterizing the site day population.

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# Collaboration to promote outdoor life (friluftsliv) in the Nordic countries – Is an action plan the way forward?

| SESSION | PART | DATE | TIME | CHAIRS |
|---|---|---|---|---|
| 4B | - | Wednesday 18th August | 14.00 – 15.20 CET | Morten Dåsnes |

| | Programme |
|---|---|
| *4B* | **178** Collaboration to promote outdoor life (friluftsliv) in the Nordic countries – Is an action plan the way forward? |

# 178 Collaboration to promote outdoor life (friluftsliv) in the Nordic countries – Is an action plan the way forward?

**Morten Dåsnes**, Friluftsrådenes Landsforbund, Norway

**About the session**

Outdoor life (friluftsliv) has a strong position in all the Nordic countries, and is mainly built on the same traditions. In the Nordic collaboration, both between authorities and organisations, outdoor life have been a central theme. Nature-based tourism and outdoor life also have many commonalities in the Nordic countries.

In this round-table session, invited researchers and representatives from Nordic outdoor life organizations, will present and discuss opportunities and challenges in promoting outdoor life in the Nordic countries. The session also welcome participants to discuss ideas and reflections from other parts of the world. There will be several short presentations to set the stage, followed by plenty of time to discuss. At the end of the session we will ask if there is a need for a common Nordic action plan to promote outddor life, or are there other and better instruments?

**Collaboration between the outdoor life organisations**

In 1993, the danish "Friluftsrådet" invited outdoor life organisations from all the Nordic countries to discuss formalization of the cooperation. Representatives from Sweden, Norway, Iceland and Denmark met and agreed to continue a firm cooperation. Since then, there have been regular meetings and conferences between the national organisations for outdoor life in the Nordic countries, and the cooperation has been formalised in the NON-network (Network of Outdoor Organisations in the Nordic Countries). A main task for NON has been to approach and cooperate with the Nordic Council of Ministers, an intergovernmental forum to complement the Nordic Council and promote Nordic Cooperation.

**The Nordic outdoor life tradition**

Through the Nordic Council, several publications show the special features of the common Nordic outdoor life tradition. For example, the right of public access to countryside in the different coutries (TemaNord, 1997:501), Outddor life by the Nordic coast in (Nord, 2001:12), and old communcation routes (Nord, 1999:11).

NON has also arranged a number of conferences to discuss and support a common Nordic outdoor life culture: Public access to countryside (1995), Children and outdoor life (1997), Common policy for outdoor activities (2002), Sustainable outdoor activities (2003), Urban outdoor activities (2005), Outdoor activities in urban areas (2010). Between 2007 – 2011 the NON network managed a large project on outdoor recreation and health (Frisk i Naturen).

**A Nordic action plan?**

The next major project under the auspices of NON was "Nordic outdoor life". This project was based on the Nordic Council's 10/2014 recommendaion on "Outdoor life for children and young people in the Nordic countries". The main objective of the project was to prepare a set of recommendations to secure a high focus on outdoor life in the Nordic region in the future with a particular focus on promoting participation and influence of children and young people. Based on this project, NON concluded with five main recommendations in NON 2018:

- Strengthen the cooperation between the Nordic outdoor life organisations.
- The right of public access must be preserved and secured.
- Enhance the use of nature-based integration.
- Prioritize outdoor life in schools as a mean of improving public health and better learning enviroment.
- Green spaces must be given higher value in land management and spatial planning.

The main conclusion was that a joint Nordic action plan is needed to follow up these five recommendations.The proposal for joint Nordic action plan has not been supported by Nordic Councils of Ministers, and the further process is uncertain.

**New opportunities, beyond the COVID-19 pandemic**

The importance of outdoor life activities has been particularly evident during the COVID-19 pandemic. Through various research activities, the Norwegian Institute for Nature Research (NINA) has documented large increases in the use of recreational areas near the cities - in the Oslo area up to 300% increase. The increase is typical for the Nordic coutries and among others German og Switzerland, while many coutries have a decrease due to shutwown of parks and other green areas. (Burton, D, 2020)

On the other hand, shutdowns have led to less international travel and fewer visits to traditional tourist attractions. There is an interesting transition where domestic travellers and local recreationists are filling up the empty spaces. Under such a scenario, small scale nature-based tourism operators are likely to benefit local comminities better than large scale destinations (Fredman and Hakuleand, 2021).

Nature-based tourism in the Nordic region is largely based on the abovementioned Nordic outdoor recreation traditions. If the future of nature-based tourism implies less travel and more small-scale operations, the connection with the outdoor life tradition is likely to strengthen. Regardless of the current pandemic, both nature-based tourism and outdoor activities must take greater account of sustainability in their further development. Hence, both an increased knowledge about the opportunities associated with the outdoor life tradition and the sustainability challenges should be included in the further design of a common Nordic outdoor life policy. Whether it will be in the form of a joint Nordic action plan, or through other instruments.

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# Future directions in recreation monitoring and research

| SESSION | PART | DATE | TIME | CHAIRS |
|---|---|---|---|---|
| 4D | I | Wednesday 18th August | 14.00 – 15.20 CET | Marcel Hunziker |
| 5D | II | Wednesday 18th August | 15.40 – 17.00 CET | Søren Prestholm & Marcel Hunziker |
| 6D | III | Wednesday 18th August | 20.00 – 22.00 CET | Søren Prestholm |

| | Programme |
|---|---|
| *4D* | **168** Exploring trends of visitation: 20 years of visitor monitoring in Finnish national parks |
| | **105** Counting on success: Implementing a new approach to visitor data collection and usage in a national environmental public sector body |
| | **58** Spatial and temporal patterns of visitation: Insights from Flickr images of Chitwan National Park, Nepal |
| | **116** Comparing participatory GIS and social media data with more traditional visitor monitoring methods |
| *5D* | **5** Monitoring approaches in Switzerland that integrate both physical/spatial and preference/recreation data |
| | **122** How to survey on the "Last child in the woods" – Danish experiences with who and how to ask about children's use of nature |
| | **72** Monitoring recreational fishing activities: anglers' attitudes towards a national catch reporting program |
| | **50** Sounds like Norway: a review of research needs and future paths |
| *6D* | **32** The infinite visit: A unifying temporal/spatial framework for visitor management |
| | **14** Visits counting from point data to area and period estimates |
| | **139** Community science supported recreation data using a SMS chatbot |
| | **112** Steps on a path: An application of machine learning using a random forest algorithm to predict visitor use levels on trails in Rocky Mountain National Park, USA. |
| | **24** The influence of deadwood on forest recreation – results of a choice experiment in Bavaria/Germany |

# 168 Exploring trends of visitation: 20 years of visitor monitoring in Finnish national parks

**Liisa Kajala[1], Henna Konu[2], Jarmo Mikkola[2], Marjo Neuvonen[2], Matti Tapaninen[1], Liisa Tyrväinen[2]**, [1]Metsähallitus, Parks and Wildlife Finland, Finland. [2]Natural Resources Institute Finland, Finland

The demand of nature-based tourism and recreation has increased due to changes in society, leisure, urbanization, and increased awareness of the health benefits of nature, and during the COVID-19 pandemic destinations such as national parks and protected areas have become even more popular (e.g. Haukeland et al. 2021; Rikkonen et al. 2020). The steady growth during the last decade can be identified also from the increased number of national park visits in Finland (see Figure 1). The growing numbers of visitation, combined with the increase in park hectares, place pressures for management, especially as customer needs and preferences have become increasingly diversified. Gaining visitor insight – identifying growth trends and changes in visitor profiles – is essential for the quality of management in national parks. The purpose of this study is to gain a broader view on the development and trends of visitor motivations, activities, and demographics during the last 20 years. More detailed examination is also made in four park categories.

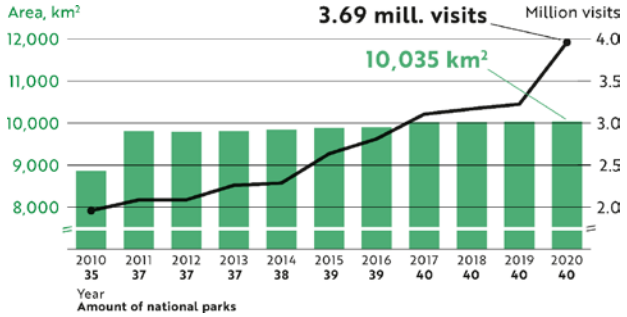


*Figure 1. Development of the Finnish national park network and numbers of visits during 2010-2020 (https://www.metsa.fi/en/outdoors/visitor-monitoring-and-impacts/visitation-numbers-and-visitor-profiles/).*

Past twenty years Parks and Wildlife Finland has conducted visitor monitoring in a systematic way in Finnish national parks to provide quantitative figures and information on visitation. The data is collected for management and monitoring purposes and it is applied to manage natural resources as well as to better understand visitors' perceptions and needs for services, and to determine whether separate visitor groups can be identified that differ according to their motivations and interest in using various tourism services (e.g. Konu & Kajala, 2012). The data also provides a knowledge-base and understanding of the full range of benefits, such as health benefits in protected area context and local economic impacts of the recreation and tourism.

The data is gathered in a uniform manner across the country. The standardized methodology was originally developed during 1998–2000 (e.g. Erkkonen & Sievänen 2001; Kajala 2006) and later on the methodology has been updated and developed. The data of this study consists of 47,647 visitor survey responses of 40 national parks in Finland from years 2000–2019. The number of surveys conducted is 101. The dataset includes a wide range of variables, e.g. motives for visiting the national parks, visitor satisfaction, experiences of the visit (positive or negative), trip characteristics (length of stay, group size etc.) and outdoor activities during the park visitation, measured systematically during the 20 years' time. For more in-depth analysis, the parks are classified into four categories based on the population density of the surrounding area of each national park (Metsähallitus & Metsäntutkimuslaitos, 2009) to examine the possible differences in visitor profiles, and to study the temporal change in visitors and their motives.

The tentative results illustrate demographic changes in national park visitors' profile during the examination period. For instance, the share of female visitors has increased from the early years of the analysis period from 47 to 56 percent, and the mean age has slightly increased. Changes are also identified e.g. in visitor motivations, visitor satisfaction, and regarding the issues that are seen disturbing for the national park experience. When the motivations are looked in more detail, the results show that the main and most important motives to visit national parks have been throughout the 20-year

period nature experiences, scenery, relaxation and getting away from noise and pollution. The importance of these motives has grown rather steady during the years. After these top four motivations the next most important motives were mental well-being, being together with own group, keeping fit and getting to know the area. The least important motivations were meeting new people and experiencing excitement. There are also identifiable changes with the order of importance among the motivations. Additionally, the results show increase in the importance of motivations like mental well-being and excitement.

The activities most often conducted in the park were: hiking (incl. picnicking), walking (incl. Nordic walking), observing nature, nature photographing, enjoying nature, and watching the views, cross-country skiing, and visiting nature centers. The preliminary results indicate also increasing trend in participation in activities like walking and jogging, hiking (incl. picnicking), observing the nature, visiting nature centers, cultural heritage or geopark, nature photographing, enjoying the views, swimming, cycling, kayaking, and walking with the dog in the park. There has been also a slight increase in staying overnight in the park such as camping. The diversity of activities that visitors have participated has increased, e.g. increase snowshoeing, geocaching and participation in guided tours.

The tentative examinations also indicate differences in demographic factors such as gender and age, and motivations of people visiting different types of national parks. For example, the visitors in national parks close to big cities are somewhat younger than in national parks located in densely populated and rural areas or near tourist centres.

The longitudinal data collection with a systematic monitoring method allows managers both focus on the park level, but also to capture development in time and enable knowledge-based management in the park system. The results help to guide management, and for instance, the information is utilized in monitoring the impact of visitation and to set up the limits of acceptable change. The customer insight supports service and experience design at the destination level, and also in collaboration with local service providers. The national park trends can be compared to the changes in outdoor recreation trends at national level.

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# 105 Counting on success: Implementing a new approach to visitor data collection and usage in a national environmental public sector body

**David Bleines Bleines**, **Susan Williams**, **Melody Rhydderch**, Natural Resources Wales, United Kingdom

**Introduction**

Monitoring visitor use is critical for Natural Resources Wales (NRW) to protect ecosystems and to manage green space adequately, whilst maximising visitors' wellbeing and enjoyment benefits. This research aims to explore the effectiveness of different types of people counters used concurrently on NRW managed land in the Summer of 2021. It presents an opportunity to review the type of data collected and its application to support decision-making. This is timely given the changing societal backdrop pre-empted by Covid-19 and its associated impacts on nature and wellbeing.

Currently NRW uses sensor and data counting technologies to measure visitor numbers. These monitor trail and car park usage in more than 120 sites managed by NRW across Wales. These technologies do not need main power, mobile phone signal or WIFI and have been in place since 2004.

This emerging research is necessary to address four questions:

- Is the data produced by these counters still fit for purpose?
- Has the purpose itself changed?
- How is disruption minimised in longitudinal data collection when switching from one technology to another?
- How can technology be futureproofed in the face of rapid advances over the next 15 years?

The anticipated outcomes from this work will be the selection of the most appropriate visitor counter technology capable of informing NRW recreational and wellbeing policy and practice across Wales. Having this in place will better enable NRW to discharge its regulatory, advisory, land manager and wellbeing provider roles for current and future generations.

**Materials and Methods**

This research will review the effectiveness of the contract NRW holds with an external contractor who currently provides, installs and manages visitor counters. This contractor also collects, analyses and writes up the data.

The criteria for overall effectiveness will include:

- Practical considerations such as technology used, unwanted attention leading to damage/theft, maintenance.
- The ability of the data to contribute to the organisation's decision-making with regards to recreation and wellbeing policy and practice.
- Value for money, for example overall contract cost, maintenance cost, and prior infrastructure investment.

This work will involve several phases in order to examine each of the criterion above. One of these phases for example will be to test several new counters at the same time in the same place to assess their concurrent validity. Another phase will be to test whether the difference of technology will disrupt the longitudinal time series.

This research will focus on one site in North West Wales in the region of Anglesey; Newborough National Nature Reserve. This site is a multi-use visitor site with walking, cycling and running trails, and horse-riding facilities. It is also home to wildlife and red squirrels and includes a highly visited beach. It attracts nearly 400 000 visitors annually.

Alongside the visitor counter already in place at the Newborough site, 3 other counters will be installed. These counters will be from 3 different contractors and each will use different technologies. The counters will be positioned near the existing counter and record cars entering and leaving the car park. These counters will be placed from Spring 2021 to collect data over both the Easter and the Summer periods which are busy times for the Nature Reserve.

With regard specifically to concurrent validity, this will test several criteria:

- How accurate each counter is in counting the number of cars.

- How often the counter needs to be maintained (for example for battery changes, physical inspections).
- How visible counters are to the public and if they are attracting unwanted attention (possibility of theft).

Other data that can possibly be collected by these different technologies will also be identified.

In parallel, this research will also identify the current and future purpose(s) for which the data will be used in internal as well as partnership-based organisational decision-making processes. This will involve identifying as many relevant staff as possible and surveying them regarding their potential use of the different datasets produced by the different counters. It is anticipated that a snowball sampling technique will be used to identify staff, asking questions on their current use of the data and on their operational need for data collected from visitor counters.

One limiting factor is that of time. This research is restricted by the current contract running out at the end of 2021, therefore creating the need for a decision to be made by December 2021.

Results

Initial analyses will be completed by the beginning of August in time to present at the conference. This will include the results of the concurrent validation of the counters. This will also include a demographic qualitative and quantitative analyses of the results of staff survey items regarding counter data usage.

**Conclusion**

This body of work describes the process of identifying the most effective people counter and accompanying dataset to support NRW decision-making in the area of recreation, access and wellbeing for current and future generations. It has outlined the challenges facing the current approach and described the method by which alternative people counters will be evaluated. Furthermore, this piece recognises the need to revisit the applications for which the data collection will be used by staff. This will contribute to the overall evidence needs of a multi-disciplinary organisation with a national and complex remit. It has the potential to inform national policy in the areas of nature and wellbeing. It also informs the practical challenges experienced in the field by operational staff as a result of changing methodologies after collecting valuable longitudinal data since 2004.The results of this work will inform common issues faced by partner organisations across the public sector and their operational, research and policy needs with respect of the management of green spaces. At a time of changing societal patterns regarding volume and characteristics of visitors to green spaces within the UK, this visitor research makes a valuable contribution to understanding how best to capture and apply data to decision-making.

# 58 Spatial and temporal patterns of visitation: Insights from Flickr images of Chitwan National Park, Nepal

**Pragya Bhatt**, **Catherine Pickering**, Griffith University, Australia

## Introduction

Nature-based tourism is popular including to many national parks globally (Balmford et al. 2015). To conserve these natural areas and their biodiversity, while facilitating appropriate tourism, it is important to monitor visitors including when they visit, where they go and what they value. Well established monitoring methods including surveys, direct observations, interviews, track counters, ticket sales, permits, indirect observations (e.g., cameras, satellite images) as well as newer methods such as GIS tracking and Public Participatory GIS. In the last few years, social media has started to be used to monitor visitation including in protected areas. One of the most common data sources examined so far is geolocated images posted to the photo sharing platform Flickr (Teles da Mota and Pickering 2020). However, there is very limited research assessing if there is Flickr data available and if it would be useful for parks in developing countries where nature-based tourism is important, economically, socially, and environmentally but resources for monitoring are limited, such as in Nepal.

Here we test how social media could be used to monitor visitation in parks in countries such as Nepal. We analyzed images about Chitwan National Park posted to Flickr, including assessing: 1) when do people visit the Park and how similar are the patterns to ground visitor data, 2) where do people go and how does this vary seasonally and 3) what do people value in the Park.

## Methods

Chitwan National Park was the first national park in Nepal and covers 953 $km^2$ in the core park and an additional 729 $km^2$ in the buffer zone. It is an UNESCO World Heritage Site and is popular with domestic and international tourists. Metadata about publicly available geolocated images in the core and buffer zone of the Park till the end of 2019 were obtained using Flickr's Application Programming Interface (https://www.flickr.com/services/api). To minimise bias from some people posting many images, a maximum of three photographs (the most viewed) per visitor were selected resulting into 1,214 images from 503 visitors for analysis. The number of images were compared with monthly visitor data from the Park webpage (Nepal Government 2021). The geolocation of images was plotted using QGIS to generate the visitor distribution maps for the Park overall, and per season. To explore what visitors valued, word cloud showing the 50 most common words used by visitors in the tags, titles and description of their images was generated online in 'https://www.wordclouds.com'.

## Results

Most images of the Park were taken in the main tourism seasons: autumn (September-November) and spring (March-May) (Figure 1a) and the proportion of images per month were similar to the number of visitors per month (Spearman Rank correlation $r^2 = 0.748$, $p = 0.005$). Visitation in the Park was concentrated with more than half (58%) of the images in the buffer zone and many others in the Sauraha area in the central east of the Park which is the main entrance to the Park (Figure 1c). Although there is clear seasonality in visitation, the spatial distribution of visitors was similar among seasons (Figure 1c). Visitors were found to value wildlife, landscapes and culture with words describing such attributes prevalent in the tags, titles, and description of their images (Figure 1b).

## Discussion

This study demonstrates how metadata from geolocated Flickr images can provide insights into visitation to national parks such as Chitwan including when and where people visit and what they value. Such information is useful for planning and maintaining tourism facilities such as trails, accommodation, food outlets, information centres, signs, and drinking water, and minimizing social conflict and impacts on natural resources. The results highlight the potential of social media as an inexpensive, time-effective, and accurate method in visitor monitoring in natural

areas (Rossi et al. 2019) including in developing countries. However, there are important limitations of social media, including that it does not represent all visitors and is more popular with younger, wealthier, and educated people from some countries, different platforms vary in popularity among regions, demographics and countries, and platforms are increasingly restricting access to data, and ethical and privacy issues are important when analysing this and other types of social science data (Hausmann et al. 2018).

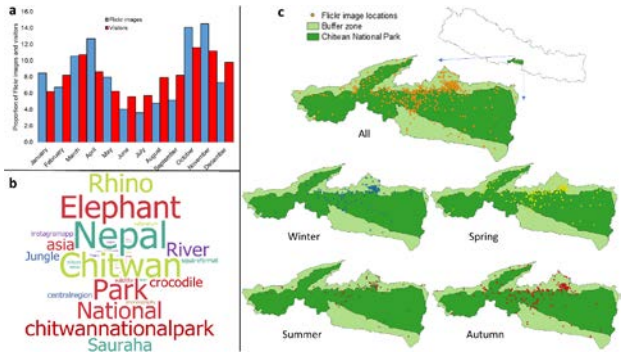


*Figure 1: Results from an analysis of metadata associated with 1,214 Flickr images posted by 503 visitors to Chitwan National Park, Nepal: a) Proportion of Flickr images and actual visits per month, b) Word cloud showing the 50 most common words used in the tags, titles, and description of the images, with the larger the size of the word, the often it was used, and c) Location where the images were taken in the Park including per season.*

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# 116 Comparing participatory GIS and social media data with more traditional visitor monitoring methods

**Elina Hutton**[1], **Ari Nikula**[2], **Seija Tuulentie**[2], [1]University of Lapland, Finland. [2]Luonnonvarakeskus, Finland

Visitor numbers, new user groups and new activities in recreation areas are increasing and thus creating a need for new visitor monitoring tools. These methods should ideally provide continuously updating, located data of user groups and activities. Our aim was to explore the usability of public social media data, web-shared GIS and online PPGIS surveys for visitor monitoring in remote and less visited protected recreational areas. The study was made as a part of Interreg Nord funded Halti project in a border region of two Nordic countries consisting of popular recreational sites of Käsivarsi Wilderness Area, Malla Strict Nature reserve and Kilpisjärvi village in Finland and Reisa National Park and Kåfjorddalen in Norway.

We conducted a cross-border visitor survey and monitoring pilot in the Halti transboundary area in Finland and Norway in summer 2019. We collected public social media data from Facebook and Instagram, conducted a participation geographic information system (PPGIS) survey and purchased GIS data from Strava Metro. Each data was individually studied and compared with traditional and standardised face-to-face visitor survey from Finnish Metsähallitus. We found out that while social media data has limitations, it can work as a tool to identify themes which require further study. Web-shared platforms such as Strava and PPGIS data can be used both for monitoring visitor behaviour, but also to identify potential risk areas of heavy use overlapping high natural values. PPGIS survey is becoming a popular tool to reach visitors and it is also an effective tool to reach certain groups, which are hard to reach with on-site survey questionnaires, such as mountain bikers or fishers.

In our region the largest age group of visitors is under 45 years old, which corresponds with high social media use in Finland and Norway. In the traditional visitor survey about 70% of the respondents said they will post about their trip on social media.

The results indicate that public social media data and web-share GIS data can be used to monitor some changes and to identify potential hot spots faster than a traditional visitor survey. Online PPGS survey results were also very similar to the traditional visitor survey results but as a tool it provides more updated data and reaches larger amount of respondents cost effectively. We conclude that online tools can be considered as an alternative or at least a very good addition to the traditional visitor survey for protected recreational areas.

# 5 Monitoring approaches in Switzerland that integrate both physical/spatial and preference/recreation data

**Marcel Hunziker[1]**, **Tessa Hegetschweiler[1]**, **Flurina Wartmann[2,1]**, **Boris Salak[1]**, **Nicole Bauer[1]**, **Lina Torregroza[1]**, **Felix Kienast[1]**, [1]Swiss Fed. Res. Inst. WSL, Switzerland. [2]University of Aberdeen, United Kingdom

In Switzerland there are two major monitoring programs that include outdoor recreation and try to integrate physical/spatial data from area statistics and remote sensing as well as social data from surveys. The first one is forest monitoring consisting of the National Forest Inventory (NFI) as well as the socio-cultural forest monitoring WaMos. The second one is the landscape monitoring program LABES which includes various physical/spatial indicators as well as preference data from surveys.

Forest monitoring normally either focuses on physical aspects such as tree species, stand structure, etc. or on social aspects such as forest recreation and preferences. However, in forest recreation, both the physical characteristics of the forest as well as the social aspects play an important role. The question aroused whether NFIs and socio-cultural forest-monitoring surveys could be combined to explain and possibly even predict forest recreation patterns from forest-related and visitor-related data.

In order to achieve this, we tested two approaches. In the first one we took the most relevant parts of the questionnaire from the Swiss socio-cultural forest-monitoring survey and used them in a forest visitor survey at NFI sample plots. In addition, visitors were asked to rate the visual attractiveness of the NFI-plot and the surrounding forest. NFI-data were collected from 4 systematically arranged 50x50 m plots, covering the forest area visible to visitors from the footpath. Multi-level modelling combining both plot-related inventory data and visitor-related questionnaire data showed that forest attractiveness is determined by both social and physical factors (Hegetschweiler et al. 2018).

In the second approach we used photographs of NFI sample plots with known forest data in an online survey in the whole of Switzerland. Again, the respondents were asked to rate the visual attractiveness of the forest depicted. Regression models and multi-level modelling were again used to combine physical forest data and questionnaire data to predict visual attractiveness and recreational usage of forest (Hegetschweiler et al. 2020).

Results show that visual attractiveness could be explained by a combination of several NFI-parameters, such as stand structure, and social factors, such as contemplative visitation motives.

Most of the landscape monitoring programs in Europe and worldwide are limited to the physical and biological space (Kienast et al. 2019) despite the fact that land-use is strongly linked to the socio-cultural realm via people's perception, as it is stated by the definition of landscape of the European Landscape Convention. The Swiss Landscape Monitoring Program LABES is one of the first large-scale landscape observatories where not only physical/spatial data are included but landscape perception has been systematically monitored with representative surveys from the beginning of the monitoring program. The entire monitoring consisted of roughly 30 indicators. Approximately 25% of the indicators measured perception properties: Respondents were instructed to base their statements on the landscape and places of their current home municipality rather than on pictures of specific landscapes.

In the first run of LABES 2010 the physical/spatial and the social preference data were gathered and analysed more or less independently resulting in separate clusters of indicators. However, first attempts to correlate physical/spatial indicators with social/preferential ones turned out to be highly promising (Kienast et al 2015). There was, e.g., a clear interdependence of high urban-sprawl values and low preference values. Nevertheless, the findings remained statistical correlations, and it lacked a theory-driven empirically supported explanation of this interdependences.

A method re-development project was, thus, conducted to close the gap between physical/spatial indicators and the social ones. We included indicators focusing specifically on the contents of what is measured by the physical/spatial indicators. In addition, the latter were extended by recreation

suitability and use indicators to allow going beyond only landscape preferences. Multi-level and structural equation modelling then was applied to analyse the complex data in an adequate way (Wartmann et al. 2021a, 2021b, re-subm.)

Our results on the individual level show that how long residents have lived in a region and how well they can see the landscape in an unobstructed way are significant predictors of perceived landscape quality. At the municipality level, the type of municipality and the biogeographic region are significant predictors to explain variance between municipalities.

Finally, the question arises which of the mentioned approaches, and others, are most suitable for which task. On-site surveys of course are most adequate for regional studies and for exploring the mechanisms, photo-based online surveys help to include a large population but still stick to particular situations represented on the photographs. And finally, the general municipality evaluation regarding landscape and recreation quality is best to gather information about the public perception of large areas as countries or beyond (suitable to compare the situation in, e.g. the whole of Europe).

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# 122 How to survey on the "Last child in the woods" – Danish experiences with who and how to ask about children's use of nature

**Soeren Praestholm**[1], **Soeren Andkjaer**[2], [1]University of Copenhagen, Denmark. [2]University of Southern Denmark, Denmark

In 2005 Richard Louv described children's decreasing contact with natural environments under the headline "Last in child in the woods". The title accords with the notion of "extinction of the experience" and a reported drop in frequency of visits and activities in nature among children in Western world societies (Soga & Gaston, 2016). Also in Denmark, falling numbers of visits and time spend in nature across generations has been reported (Fjeldsøe 2018).

However, it is not methodologically straight forward to survey on children's use of nature. Children's capability to understand questions and provide answers varies, not least between different age groups. Hence, questionnaires are often provided to the parents instead of the children themselves leaving the researchers with secondary data about the children's activities, motives, preferences, perceived constraints etc. There are other obstacles causing potential bias. Ambiguous terms like "nature" or "green space" which could be understood very differently across the respondents. Frequency of visits and/or time spend outdoors are reported, but the questions behind the results often represent challenges to the respondents: they are asked to generalize about children's/their practices over a very long time span e.g. "How often would you say that your child visit nature during summer season" (translated from Fjeldsøe 2018).

This paper compares and discusses pro and cons regarding choice of different survey methods based on recent surveys about children's use of nature and green spaces in Denmark (data collected 2015-2019). The paper focus on differences between asking the children or the parents. The primary data origins from a survey with two thousand children aging 10-15 years (Andkjær et al. 2016). Children in 5$^{th}$ and 8$^{th}$ degree answered a digital questionnaire during school time under technical supervision by their teacher. The secondary data comprises parent's responses from a national survey with responses about more than four thousand children aging 1 through 15 years (Præstholm et al. 2020). Responses regarding the same age groups as the primary data were retrieved.

The paper will further discuss the influence of terminology regarding identifying use of "nature" and various ways of questioning about the duration and frequency of visits in nature. Here two other resent Danish surveys accompanies the mentioned surveys. The aim of the paper is to support sound choice of methods and awareness of the limitations in the data used when children's use of nature, "extinction of the experience" and "last child in the woods" are discussed.

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# 72 Monitoring recreational fishing activities: anglers' attitudes towards a national catch reporting program

**Lotte van den Heuvel**, **Malgorzata Blicharska**, **Samuel Blyth**, **Patrik Rönnbäck**, Natural Resources and Sustainable Development, Department of Earth Sciences, Uppsala University, Sweden

Recreational fishing activities have been facing a decline in participation rates throughout industrialized countries in recent years (Arlinghaus et al., 2015). However, many countries are now seeing a considerable increase in recreational fishing license sales as a response to the restrictions on many indoor sports and leisure activities caused by the Covid-19 pandemic (Cooke et al., 2021). Recreational fishing activities have the potential to affect fish populations worldwide, but data about actual fishing pressure is lacking in many countries. Despite the European Commission's recent call for monitoring all fishing activities (including recreational efforts), the development of monitoring programs is still moving slowly. Increased understanding of potential ecological impacts of recreational fishing, combined with the current positive participation rates, emphasize a demand for monitoring recreational fishing catches and effort.

A potential solution to this problem, that has been gaining popularity in recent years, is the use of angler-generated data in fish stock assessments. Involving the public in this type of ecological data collection, often referred to as "citizen science", presents numerous benefits, such as the improvement of scientific literacy, cost efficiency, and environmental educational opportunities (Bonney et al., 2009). Additionally, these monitoring programs specifically allow for the collection of data on the human dimensions of recreational fisheries (Gundelund et al., 2020).

Several countries are already using such collaborative monitoring programs on a national scale, for example in the Netherlands and Denmark. The Swedish government also intends to develop a catch reporting program for recreational fisheries. In order to ensure successful adoption of such a program, there is a need to understand anglers' perceptions on reporting catches. In this study we distributed an online survey among members of the Swedish Angling Association to assess that. Moreover, we accounted for angler heterogeneity dimensions by assessing the effects of different consumptive orientations and environmental attitudes on the anglers' perspectives on catch reporting.

Our study revealed that most anglers supported the involvement of anglers in fish stock monitoring through the reporting of recreational catches. Considering the effect of environmental attitudes, significant positive relationships were found between support for a catch reporting program and the sense of responsibility towards conservation issues. A similar effect was found for anglers with a strong orientation towards catching big fish. On the other hand, consumptive orientations related to either keeping the caught fish or catching large numbers of fish had a significant negative relationship with catch reporting support. Despite the predominantly positive attitude towards a potential catch reporting program, consumptive orientation and environmental attitudes were proven to play an important role in the anglers' preferences towards a collaborative monitoring approach to data collection. This result supports the notion that one size does not fit all when it comes to recreational fisheries management (e.g. Johnston et al., 2010).

Compliance with environmental management regulations, such as a catch reporting obligation, is a result of complex interactions between a person's attitudes and beliefs (Winter & May, 2001). Our study suggests that a better understanding of the diversity of attitudes and preferences towards recreational fisheries management, and their relationship with consumptive orientation and environmental perspectives, is vital to the successful implementation of collaborative monitoring regulations.

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## 50 Sounds like Norway: a review of research needs and future paths

**Rose Keller**, Norwegian Institute for Nature Research, Norway

Many of us experience some surprise when we step off a beaten trail and into a wooded dell. Suddenly, we feel a bit closer to nature: not because we have finally arrived, but because we finally hear. There has been an emphasis in research and conservation policy about the visual features of landscape. Yet, we hear place as much as we see it. The weaving of sounds and perception within place is called the soundscape. Natural soundscapes (areas mostly free of undesirable anthropogenic sounds, i.e. noise) provision human wellbeing and influence positive behavior, whereas noise in nature severely degrades experiences connected to outdoor life (i.e.'friluftsliv') and impacts wildlife. In Norway 2.1 million (40%) are exposed to outdoor noise exceeding 55dBA - a level known to drive adverse health effects- and has serious implications for effective conservation of biodiversity and diverse restorative experiences in national parks. Thus, parks have an increasing importance to harbor natural sounds and areas free of noise. This paper presents a possible series of steps to assess and monitor natural soundscapes, following guidance provided by the US National Park Service Division of Natural Sounds, and the work of Ferraro et al. 2020, Levenhagen et al. 2020, among others: 1. establishing what sounds people expect or need to hear when recreating in particular national parks and what constitutes noise (national survey); 2. inventorying sounds using passive audio recorders (PARs) linked as a sensory array from remote to high access settings (ecological and human disturbance gradient); 3. linking reported friluftsliv experience with perception of place and sounds to collected acoustic data(attended listening survey); 4. mapping noise proliferation in parks (PARs); 5. experimentally modify noise levels via messaging or restricting recreation equipment use to examine effects on bird distributions (point counts) human perceived (bird)biodiversity, quality, wellbeing and support for natural sounds conservation efforts (survey); 6. bring in identified important natural sounds and noise sources as indicators of soundscape quality in a management by objective framework for natural resource managers. The paper highlights how these steps may be deployed in two case studies, Femundsmarka and Rondane national parks.

# 32 The infinite visit: A unifying temporal/spatial framework for visitor management

**Jeffrey Skibins**, East Carolina University, USA

As they are currently conceived, visitor use management frameworks for parks and protected areas (PPAs) are built upon false dichotomies and artificial constraints which preclude them from reaching their objectives. Current frameworks create artificial constraints around the discrete on-site visit rather than considering it part of a broader temporal-spatial recreation experience, which most recreation theories advocate. Failing to temporally-spatially contextualize beyond the on-site visit artificially constrains visitor engagement and relegates visitors to being viewed as a resource to be managed rather than as partners in mission. This creates false dichotomies around the questions of when a visit begins and ends, as well as the role of a visitor.

Another false dichotomy promulgated by current frameworks is the development of socio-ecological benchmarks. These are often developed via post-experience surveys, fail to address shifting baselines, and almost always exclude non-visitors. Furthermore, the development of norm curves, developed from an artificially constrained sample, fails to address dynamic conditions and is rooted in a 'less is more' philosophy. Implementation creates artificial dichotomies as benchmarks fail to be responsive to shifting use and changing populations.

At the systems level, current frameworks fail to address the geopolitical and temporal-spatial cross-boundary nature of the visitor experience. This creates false dichotomies within the visitors' understanding and ability to create meaningful mental maps and artificially constrains systems level solutions as agencies cannot integrate extra-site visitor experiences.

In order to address these issues visitor management needs to evolve beyond single framework styles and embrace a multi-theoretical multi-tiered approach. Integrating diffusion theory (to address visitor behaviors) and the recreation opportunity spectrum (to address visitor motivations) under a multi-phasic leisure paradigm would allow PPAs to overcome geopolitical and temporal-spatial constraints. Adopting a multi-phasic leisure paradigm will also empower managers to explicitly recruit non-users, thus creating more robust samples for socio-ecological benchmarks. Fuzzy logic modeling will allow managers to evaluate and adapt benchmarks in a more iterative fashion that is more reflective of the visitor experience, include non-visitors, and create more realistic forecasts. Fuzzy logic modeling incorporates qualitative and quantitative data in a cohesive method and allows for non-participant and non-visitor inclusion. At the systems level, visitor use management is best addressed via a resilience-panarchy framework. From this viewpoint, PPAs are better strategically positioned to absorb and respond to visitor use. Multi-phasic leisure and fuzzy logic are ideal approaches to nest under a resilience/panarchy framework, as they allow for iterative feedback between the visitor experience, development of benchmarks, and resilient systems.

This presentation will propose creating an iterative cycle, driven at the systems level by a panarchy scaffold, and informed by nested tiers of temporally-spatially robust management frameworks, developed using fuzzy logic modeling, recreation opportunity spectrum, diffusion theory, and multi-phasic leisure. In so doing, a more holistic and responsive approach to visitor use management is generated. One that contextualizes the experience beyond the discrete on-site visit to be broadly inclusive of visitors' collective recreation experiences, adapts to shifting baselines, and explicitly requires pro-active engagement via electronic and social media platforms.

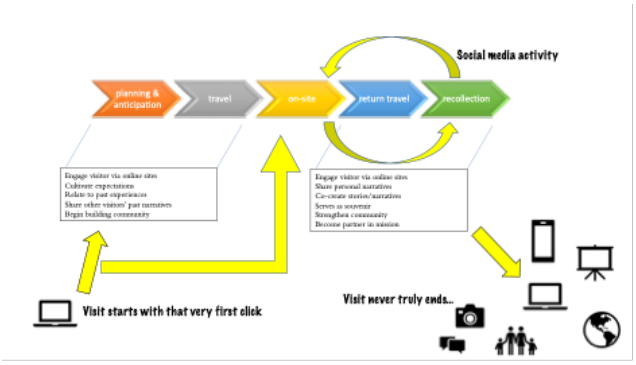


*Figure 1. Iterative multi-phasic model of infinite visit*

**Management Implications**

Many visitor management frameworks in use today are plagued by inefficiencies such as being limited to on-site visitor responses as well as being tempero-spatially static. Furthermore, they often fail to account for the role of the internet and social media. The 'Infinite Visit' paradigm may be capable of addressing these challenges, as it is a multi-dimensional, multi-theoretical framework for visitor management that is responsive to the influence of social media, inclusive of non-visitors, and able to respond to real-time changes.

The infinite visit represents a foundational shift in the role of the visitor and theoretical and practical applications of visitor management frameworks. An infinite visit framework proposes visitors become partners in mission with management agencies. In so doing, they become co-creators of conservation outcomes. This aligns with emerging data that support visitors prioritizing conservation over entertainment.

A multi-theoretical approach can better facilitate contextually appropriate visitor management interventions within a unified strategic conservation plan. This aligns with recent calls for non-linear multi-dimensional responses to visitor management. By incorporating fuzzy logic cognitive mapping, the infinite visit framework is also able to synthesize non-visitor responses, thus being responsive to future needs and shifting baselines. Finally, by scaffolding these approaches under a panarchy model, agencies will be able to create regional responses that span geo-political boundaries, thus better aligning to visitors' mental maps, and dispelling public mistrust.

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Choe et al. (2017) state, "… that social media along with new mobile technology enables travelers to create new meanings of the tourism experience across all stages of travel" (p. 440). Social media and mobile technology also facilitate visitors sharing their meanings and immediately drawing on the experiences of others, in real time, thus blurring pre/post visit distinctions. Additionally, virtual visitation, via the internet, continues to blur the boundary of what constitutes an onsite visit. As such, visitor management paradigms need to become more responsive to these fluid boundaries. In so doing, PPAs will be better equipped to address conservation and visitation objectives.

# 14 Visits counting from point data to area and period estimates

**Dominik Rüede**[1], **Fabian Krüger**[2], **Mareike Garms**[3], **Mareike Garms**[1], [1]Black Forest National Park, Germany. [2]Karlsruhe Institute of Technology, Germany. [3]

**Introduction**

"How many visitors do you have?" is a basic and frequently asked question to protected area managers. However, answering such a question is challenging in the case of recreational and protected areas that are characterized by free access and multiple entry points. Due to constraints in financial and personnel resources data collection cannot be anytime (time) and anywhere (space). Thus, the selection of suitable data collection methods and their proper combination arises (Muhar, Arnberger and Brandenburg, 2002, p.1).

Within this study, we answer the question for the Black Forest National Park by using counting devices and manual counting events. In addition to estimating the total number of visits, we estimate the relative importance of different use types such as hiking, biking and winter sports. As we are interested in monitoring changes over time, we put a special emphasis on developing a reproducible methodology that can be applied in upcoming years..

**Methodology**

Out of the many direct and indirect visitor monitoring techniques the use of counting devices is a widespread method to collect data over time. In our case, we started with 15 counting devices and used 13 of them for our final estimation. Together with experienced field staff we selected the individual counters close to the park boundary at high-volume entry points. We paid attention to build – out of individual counters - a device net that covers different use types and area usages (e.g. summer vs. winter). Our reporting period ranges from July, 1st 2018 to June, 30th 2019.

In order to use the point specific data of the device net to estimate the total number of visits on area level we needed to know the share of visits that is covered by the device net. Therefore, we organized at selected days manual counting events. On these days, our aim was to cover the number of entries to the whole area. At designated counting points (72 and 34 points on two counting events on October 14, 2018 and January 20, 2019) we recorded – separately for different use types - the route visitors took over the point and counted only those routes that we defined as first park entries. The sum of all these routes at all points was our total for the visits on the selected day. As the counting devices counted as well, we obtained a ratio of manual counts over counts by the device net. We used this ratio as a multiplier for the year-round data (from the point specific device net) to extrapolate to the whole park area.

To ensure the robustness of combining the device and manual data we ran a sensitivity analysis. Throughout the process we also addressed the accuracy of data collection (should we calibrate the count data or not, and if so, how?), the plausibility of collected data (ex-post examination to avoid false data collection) and the imputation of missing and implausible data.

**Results**

Out of the 13 counting devices we used only one direction per counter and got 411.179 visits for July 1st 2018 until June, 30th 2019. As a multiplier to extrapolate to the whole park area we got 1,893 as the weighted average of the multiplier that we observed during the manual counting events. Thus, the total number is around 778.000 visits per year. Concerning the usage types, we got 85% hiking, 10% biking and 5% winter sports.

To run the sensitivity analysis we varied the number of included counting devices, the weighting of the different multiplier as well as the degree of imputation of missing and unplausible data. Over 48 different scenarios we got 741.000 as the minimum and 847.000 as the maximum with 780.000 being the median.

To answer the calibration question we compared the manual counts and the device counts at the two selected manual counting events. Additionally, we ran manual comparisons of counts versus reality for six hours on each counter (except one for three hours). Although the individual counters

sometimes over- or undercount, the device net is collectively quite accurate. The results are as follows. For October, 14th we obtained 4107 counts with 4333 being the real number (95% captured). On January 20th, there were 2858 counts with 2477 being the real number (115% captured). For the additional comparison we got 1652 counts with 1699 being the real number (97% captured). Based on this data we assessed that the counting devices are sufficiently precise at the aggregate level. Thus, we did not adjust with calibration factors and used the raw counts instead. Statistically, this can be seen as using a very simple model, avoiding the need for parameter estimation and the risk of overfitting (see e.g. James, Witten, Hastie, and Tibshirani, 2013).

To evaluate ex-post the plausibility of the data we developed four different models to compare the counting data with. These models are based on the following data: a) other counting devices, b) other direction of same counting device, c) weather variables and d) calendar variables. We identified 17 device-day combinations as possibly problematic and finally assessed five of them as unplausible. For these cases we replaced the counter data with the average of the four estimated models.

**Discussion**

Within this study we aimed to develop a reproducible methodology that can be applied in upcoming years to monitor changes over time. The combination of counting device data with manual counting events allowed us to approximate from (place and time) point data to area and period estimates.

In addition to being able to answer the question "How many visitors do you have?", the data can be used for staff roster planning and to inform strategic decisions regarding infrastructure and park development.

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## 139 Community science supported recreation data using a SMS chatbot

**Emmi Lia[1]**, **Spencer Wood[1]**, **Sama Winder[1]**, **Lesley Miller[1]**, **Eric White[2]**, [1]University of Washington, USA. [2]Pacific Northwest Research Station, US Forest Service, USA

Collecting data on visitors demographics, their experiences, and general use patterns at recreation sites, such as trails, requires significant effort and resources. Despite this information being highly valuable to recreation planners for decision-making, there is often a scarcity of data at the appropriate spatial and temporal scales.

To address this data gap, we developed a community science method, VisitorsCount!, to engage visitors in the data collection process. Visitors provide information about their recreation trip by interacting with a simple text-messaging chabot. This method allows visitors to submit data on recreation use and visitor experience with no prior training. We tested this method in the Mount Baker-Snoqualmie National Forest in Washington State, USA. We posted signs at trailheads asking visitors to send a text message to a project phone number and tell us the number of cars in the parking lot. After their initial SMS message, the chatbot then asked a set of additional questions about their visit.

Visitors choose to volunteer information at trailheads with and without cell service. In addition, visitors typically responded to most of the questions asked by our chatbot script. Response rates were generally higher at sites with fewer visitors. In addition, the chatbot was able to collect information from visitors recreating at sites outside of normal working hours of recreation management staff.

By enlisting visitors in a community science model through SMS texting, we are able to generate valuable data using far less resources than would be otherwise required. The SMS text chatbot is flexible in that it allows managers to ask and collect various types of data related to visitors and visitation use patterns. It also provides a cost effective opportunity to collect valuable data on visitation at low use sites that require greater efforts to monitor.

## 112 Steps on a path: An application of machine learning using a random forest algorithm to predict visitor use levels on trails in Rocky Mountain National Park, USA.

**Evan Bredeweg**[1], **Ashley D'Antonio**[1], **Scott Esser**[2], **Andrea Jacobs**[1], [1]Oregon State University, USA. [2]National Park Service, USA

Understanding the location and level of recreation use in park and protected areas (PPA) can be useful for effective visitor use management. While there is a wealth of geospatial data available online and in the manager databases of many PPA, the development and format of these datasets may be shaped more by the nature of GIS software than the way visitors explore and use a PPA system. Moreover, aspects important for visitor management such as quantification of visitor use levels on trails may be more difficult to source for each trail segment than physical trail characteristics (length, location, elevation profile, etc.). It would be expected that trail characteristics would influence the traffic of visitors, but there are many other factors such as accessibility, parking, or nearby attractions that can influence visitor behavior in complex ways. While we can obtain the physical characteristics, available amenities, and relative locations of trails within the entire PPA, we often do not have visitor use levels on the same extent. In order to examine visitor use levels on the scale of the entire PPA, we need to be able to model the relationship between physical location, trail characteristics, and amenities that ultimately shape visitor use.

The goal of this study was to predict visitor use levels on less intensely monitored trails in Rocky Mountain National Parks, USA using a small subset of well-monitored trails and trail characteristics extracted from existing geospatial datasets. To develop this park-wide trails geospatial database with estimated levels of visitor use, we employed a random forest algorithm trained on a subset of trails within the park assigned with expert-derived use levels. The training dataset consisted of 53 different trails which consisted of 94 individual trail segments with had one of five usage levels (Low - 1, Moderate - 2, Fairly Heavy - 3, Heavy - 4, Very Heavy - 5). The geospatial dataset consisted of the trails database from the park (468 trail segments in total) which included associated geolocations and specific attributes such as park management unit, establishment dates, and classification for trail surface and development. In addition to the variables within this dataset, we computed a variety of variables for each trail segment that we predicted could shape visitor use levels. These included values such as the elevation profile, trail grade profile, park entrance proximity, distance from nearest trailhead, parking availability at nearest trailhead, and visitor-count/entrance weighted accessibility. We fit a classification random forest (RF) algorithm using a set of 24 covariates with our 1 categorized response variable of trail visitor-use. We fit the RF model using 1000 trees (ntree) and optimized the number of candidate variables per split (mtry) by exploring possible values from 1-24. This model had an out-of-bag error rate of 25.52% for the training dataset. The out-of-bag error rate is used in Random Forest algorithms to estimate prediction error in a form of 'leave-one-out' cross-validation. However, with trail usage being an ordered categorization, we also wanted to assess the errors of misclassification that were greater than one classification level. These gross misclassifications of trail visitor-use only occurred on 8.5% of the trail segments in the training dataset. Using the optimized Random Forest model, we predicted the trail visitor use levels for the remaining 374 segments with unknown levels.

Importantly, the covariates used in this model are often values that can be derived from publicly accessible geodata sourced from OpenStreetMap or other online geodatabases. Even the geospatial data layer for hiking trails can be accessed through such sources. This means that an approach such as this one can be used in small PPA areas with limited in-house geospatial resources or across multiple PPA jurisdictions. To improve model performance, this approach can include additional covariates that capture more detailed aspects of trail attractions such as water access, wildflower viewing, wildlife attractions, etc.

A variety of additional avenues of research and monitoring are possible with an informed estimate of visitor use levels on trails. This kind of modeling effort can inform the best locations for more quantitative measurements of trail use (i.e., where to install trail counters) and aid in a more systematic measurement of visitor behavior. It can highlight areas of differential use for future surveys of visitor perception of crowds while hiking. Poor model performance can highlight the need for additional monitoring of trails or the possible departures of

visitor behavior from trail-centric recreation decisions. Variation in the visitor use of trails can inform the further analysis of social trail formation or negative impacts on wildlife species.

While this model is not a perfect representation of human behavior within the Rocky Mountain National Park trail network, it provides an informed estimate of visitor use levels on unmonitored or minimally monitored trails by leveraging a subset of known trails. Having a geospatial network of informed visitor use levels at the scale of an entire PPA can provide information for new research projects and the context to support PPA managers in their management and conservation goals.

# 24 The influence of deadwood on forest recreation – results of a choice experiment in Bavaria/Germany

**Philipp Sacher**, University of Göttingen, Germany

**Introduction**

Forests cover one third of the land area of Germany. They are among the most important land use forms in the country and provide important ecosystem services (ESS). After centuries of human influence, only a few forests develop without human interferences. In particular, the core zones of large-scale protected areas like national parks have to be mentioned here. One characteristic feature of natural forest development is deadwood, which occurs in most managed forests only to a small extent. However, deadwood is an important factor for biodiversity and long-term health of forests and should be preserved instead of removing it (Thorn et al. 2020). The importance of deadwood for forests was also recognized in the German National Biodiversity Strategy of 2007. This also includes programs for the enrichment of deadwood in mainly commercially used forests which are often visited for recreational purposes.

Thus, the question of how the general public will react to different deadwood management measures in terms of recreational behavior is of great interest. Ultimately, the goal of this research was to identify trade-offs that arise between a more biodiversity-oriented forestry and recreational values of forest.

**Deadwood and forest recreation**

There are a number of studies analyzing people's preferences for and/or attitudes towards deadwood in forests (Pastorella et al. 2016; Pelyukh et al. 2019; Rathmann et al. 2020). However, most of them focus on aesthetic values and preferences for several forest characteristics, including deadwood, but not on how these preferences will affect forest recreation behavior.

Deadwood is an important structural attribute when it comes to people's perception of forests (Filyushkina et al. 2017), especially when it occurs in extreme forms (e.g. bark beetle infestations). However, it remains unclear whether recreationists would avoid forests with higher deadwood shares, especially those that are still economically used, without being assigned to the special case of protected areas (and thus not showing special conditions) and how more deadwood in those forests would explicitly affect their recreational value.

**Survey Area and Methods**

In order to better understand the relationship between deadwood and forest recreation, an online survey was carried out in 2018 in the German federal state of Bavaria (Sacher 2020). 1572 respondents participated in the study. A semi-standardized questionnaire was applied. Core was a choice experiment (CE) in which the respondents should select the forest they would like to visit next time. They could choose between three alternatives, differing in terms of tree species composition, deadwood amount and structure, habitat availability for endangered species (measure for biodiversity quality) and travel distance (measure for the willingness to travel (WTT) instead of the usually used willingness to pay since visiting forests in Germany is for free). In each choice set, the status quo consisted of the respondents' last visited forest. The participants could virtually "rebuild" it by answering questions about specific defining characteristics. The forest alternatives where visualized by drawings (at least 144 different for all possible attribute-level-combinations).

To test for effects of deadwood as a forest element three modified choice tasks (treatments) were applied. They differed in the number of attributes that described aspects of deadwood and attributes that described other characteristics of forests that might be important for forest visitors. Thus, it was investigated whether the presentation of the deadwood affects choices. The number of deadwood related attributes was reduced from treatment T1 to T3 and replaced by other forest characteristics.

The CE was analyzed using multinomial logit (MNL) and latent class models (LCM).

**Results and Conclusions**

The MNL shows a strong and significant preference for shorter distances to forests indicating the theoretically assumed negative demand curve.

Furthermore, in T1 and T2 one of the alternatives is preferred over the last visited forest. This shows that the forest alternatives differing from the status quo apparently provide a higher utility and WTT. However, in T3 such a preference could not be identified.

The results show that deadwood amount does not essentially influence respondents' choices; only slight differences occurred between the levels and the preferences did not vary significantly between the three different treatments. In contrast to the often-identified bell-shaped curve in previous studies (Edwards et al. 2012; Giergiczny et al. 2015) regarding deadwood amount (preference for medium levels), there was a rather neutral effect on forest recreation. One explanation could be that the study's focus was on commercially used forests which usually do not have extreme deadwood amounts.

In the LCM, most of the respondents have a high probability to be members of class 1 (37.7%), labelled as "deadwood variety seekers". Second most respondents are members of class 2 (34.5%). As their preferences were quite similar to class 1 they were labelled as "variety seekers sensitive to higher deadwood amounts". Class 3 makes up the smallest group (27.8%), labelled as "satisfied with status quo". Their members – unlike the other two groups – prefer their last visited forest which is characterized as "tidier" (less deadwood and structural variety).

The analysis also indicated that deadwood quality is relevant for forest recreation. This is important because particularly standing structures often provide valuable habitats. Respondents showed strong preferences for the improvement of habitats of endangered species. However, there is a discrepancy between preferences for deadwood amount and habitat availability. Respondents do either not seem to know, understand, recall or deliberately ignore the ecological link between these factors. This is meaningful for forest management as more efforts are needed to gain knowledge of the Bavarian public about the typical signs of natural forest development. In principle, an increase in the amount of deadwood in commercially used forests would not lead to a decrease in the ESS recreation. Thus, trade-offs between more biodiversity-oriented forest management and recreation are most likely not critical and recreation purposes are no valid argument against more natural structures in Bavarian forests.

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# New and emerging smart technologies for visitor monitoring – a critical review

| SESSION | PART | DATE | TIME | CHAIRS |
|---|---|---|---|---|
| 4F | I | Wednesday 18th August | 14.00 – 15.20 CET | Anton Stahl Olofsson & Andreas Skriver Hansen |
| 5F | II | Wednesday 18th August | 15.40 – 17.00 CET | Anton Stahl Olofsson & Andreas Skriver Hansen |

| | Programme |
|---|---|
| *4F* | **33** Opportunities and limits of social media data for monitoring and valuing visitation in protected areas – evidence from the German national parks |
| | **40** Monitoring visitors in diffuse nature areas, a case study in the Belgian Ardenne |
| | **62** Assessment and accuracy improvement of monitoring of tourism traffic in a mid-mountain national park (MSTT: Monitoring System of tourist traffic) in Stołowe Mountains National Park, SW Poland |
| | **67** Comparing landscape value patterns between participatory mapping and social media content across Europe. |
| *5F* | **86** Critical comparison of social media and other user-generated geographic information as a source of visitor information – lessons learned in the SoMeCon-project |
| | **98** Triggered trail camera images and machine learning based computer vision as alternative to established visitor monitoring approaches? |
| | **180** Using web share services to monitor high sensitive habitats. A GIS approach to Pedraforca, Spain. |
| | **104** Nature-based tourism experiences between mobile connectivity and the freedom of disconnecting |

# 33 Opportunities and limits of social media data for monitoring and valuing visitation in protected areas – evidence from the German national parks

**Marius Mayer**[1], **Michael Sinclair**[2], **Manuel Woltering**[3], **Andrea Ghermandi**[2], [1]University of Innsbruck, Austria. [2]University of Haifa, Israel. [3]Julius-Maximilians-Universität Würzburg, Germany

As exemplified by the recent review articles by Ghermandi and Sinclair (2019) and Teles de la Mota and Pickering (2020), social media as data source for environmental sciences, nature-based tourism and visitor monitoring is a highly dynamic field. However, what is missing despite many promising results are validations of the results of social media analyses against those obtained with "traditional" onsite visitor monitoring approaches. Therefore, we compare in this contribution social media data (Sinclair et al. 2020a,b) and onsite survey results (e.g. Job et al. 2016) in nearly all German national parks with respect to visitor provenance, visitor type (local, daytripper, vacationists) and recreational value of national park visits (consumer surplus). Furthermore, we estimate visitation numbers based on social media data for protected areas without systematic visitor counting and provide information about the spatio-temporal visitor behavior in the protected areas.

The methodology is described in detailed in Sinclair et al. 2020a,b. Our approach relies on information from the photo-sharing platform Flickr, from which we downloaded the metadata of all pictures taken between 2005 and 2018 in the GIS-specified spatial envelopes of the 16 German national parks. These pictures were aggregated to photo-user days (PUD), that means we can control for multiple photographs uploaded by individual visitors during a single visit. As only 34% of the identified national park visitors uploading photos on Flickr provided geospatial information on their home city/region in their user profile, we applied several approaches to predict national park visitors' home location (Bojic et al. 2015). This is necessary to group them into visitor types and to estimate the recreational value of national parks based on travel cost models (TCM). Regarding the last-mentioned step, we exactly replicated the TCM approach from Mayer and Woltering (2018) to allow direct comparisons between onsite survey- and social media-based TCM. The visitor structures of the onsite surveys were compared using correlation and regression analyses. All in all, our analyses are based on 71,974 Flickr photos, aggregated to 15,993 PUD.

One important aspect of the research was to compare the representation of different visitor types from social media to that found by onsite surveys which consist of over 24,000 interviews undertaken at the parks. The Pearson correlation values comparing shares of visitor types between social media and onsite survey data are 0.77** for international, 0.83** for local and 0.98** for non-local German visitors (** indicates p-value <0.01). Non-local Germans are underrepresented by 30%, while local and international visitors are both overrepresented by 15%. The overrepresentation of international visitors is higher for more promoted and marketed parks such as Berchtesgaden (see Sinclair et al. 2020a). Regarding the TCM results, most parks show a similar consumer surplus value per trip if we compare survey- and social media-based TCM approaches. The mean absolute error (MAE) per trip is EUR 4.93 and the mean absolute percentage error (MAPE) is 22%. Such results compare favourably with the unit value transfer approach, a common alternative to primary surveys (Sinclair et al. 2020b). Thus, our results successfully validate the TCM approach based on social media data, affirming its potential as an alternative to the valuation of recreation in natural and/or protected areas. This approach can successfully replicate the results of conventional TCM based on representative onsite surveys.

Based on these experiences (and Ghermandi & Sinclair 2019 as well as Teles de la Mota & Pickering 2020), what are the pros and cons of social media as information source about nature-based recreation activities? On the pro-side data can be collected from distance, in a relatively simple way and at low costs; they complement other data sources and can help effectively analyzing the spatial and temporal patterns of visitation; social media data can help evaluate different cultural ecosystem services, assess visitors' emotions and recreational values; they provide similar results compared to surveys and/or

visitor counts; they allow for the timely update of visitation estimates and recreational values. Negative aspects contain varying popularity of social media platforms and limited data access; social media data only represent a relatively small subset of visitors, areas/sites and activities; they often include limited socio-demographic information and require the clarification of ethical issues concerning data security and protection of users' privacy.

To sum up, social media data (like Flickr) can provide important insights for protected area and visitor management/monitoring. Social media can be used as a good proxy to determine visitor preferences for nature-based recreational experiences (Heikinheimo et al. 2017) as these preferences are not significantly different from the general recreational users in natural sites (Hausmann et al. 2017). However, we argue that they are not able to completely replace traditional visitor monitoring approaches for the following reasons: first, in many cases there are not enough social media data to exactly estimate yearly visitation numbers; second, there are (still) few possibilities to derive visitors' socio-demographics, motivations, attitudes and expenditure behavior from social media data. In this way it seems appropriate to suggest using social media approaches where no systematic visitor monitoring would be possible otherwise, be it for financial or organizational reasons (e.g. less strict protected area categories like German nature parks, or unmanaged PAs like nature reserves, Natura 2000-areas). Nevertheless, we recommend including questions about the social media behavior of PA visitors in onsite surveys in order to get representative information about the socio-demographics of social media using PA visitors.

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## 40 Monitoring visitors in diffuse nature areas, a case study in the Belgian Ardenne

**Johanna Breyne**, **Kevin Maréchal**, **Marc Dufrêne**, University of Liège, Belgium

Nature-based tourism and recreation are ecosystem services that have the potential to benefit human wellbeing, as well as local economies (Haines-Young and Potschin, 2010). They can therefore represent an important political argument to conserve and restore nature areas (Schirpke et al., 2018). However, for these contributions to be acknowledged, they should first be monitored. The number of visits to nature areas has been recognised as one of the major indicators to assess nature-based tourism and recreation (Schägner et al., 2018). Visiting frequencies are, for example, crucial for the estimation of economic contributions. However, for diffuse nature areas with multiple entry and exit points, this data is often scarce, scattered and imprecise. Recently, innovative technologies have allowed to obtain more continuous and/or detailed data for both small and larger areas (Kellner and Egger, 2016).

Our research used two of those methodologies to estimate visitor frequencies in nature areas: 1) an analysis based on passive mobile phone positioning data and 2) automatized image analysis based on photos issued from camera traps. Our case study area concerns the Ardenne forests, located in southern Belgium (Walloon region) for the period spring 2018 - summer 2019. The aim of this research is to improve ecosystem services assessments concerning nature-based tourism and recreation and, by doing so, facilitate ES being taken into account by site managers and policy makers in the sustainable management of nature areas.

For the mobile phone positioning data, a contract with the main Belgian mobile phone operator was established covering 5 periods (250 days in total) and 14 zones. These latter zones (about 15% of the Walloon territory) were selected based on population density and percentage of nature cover. Provided data are aggregated per day (8-19h) and per zone, and include visitor numbers (extrapolations based on the operator's market share), as well as details on the origin, nationality, type of stay and duration of the visit. For the analysis, only non-functional visits of more than 1-hour were included; residents of the zones were excluded.

For the automatized image analysis, twenty camera traps were placed in four of the main forest areas of the Ardenne, with 5 cameras per area. These locations superpose with the zones for mobile phone positioning data. In coordination with local administrations, the cameras were placed on trails frequently used by visitors or near points of interests (e.g. wildlife observation towers). Except for some rare cases of theft and technical defaults, the cameras operated a yearlong. This resulted in about 800 000 images that were analysed using an automatic detection and identification model (Mask-RCNN). The model was set to detect and identify three objects of interest, related to the main user profiles: persons, bikes and dogs. Model outputs included date, time and the number of objects per category. The precision of the model was verified by manually analysing a test sample (1% of the overall dataset). Also extreme outliers were manually checked.

The mobile phone data analysis revealed 8 million of visits, of which 4 million concern local recreation and 4 million touristic visits, the latter including 5% of regionals, 27% of nationals and 20% of internationals. About 4 million visits concerned short stops (1-3h) and 4 million long stops (>3h). Half of the touristic visits (52%) were combined with a local stay. The observed visitor frequencies showed a high spatial and temporal variation, which differed according to the visitor's nationalities.

Concerning the image analysis, 230 000 photos have been retained for analysis, resulting in 500 000 observed visits. Model precision resulted high for persons, but showed lesser results for bikes and dogs. An example of model detection is provided in Figure 1.

For both methodologies, variations in visitor frequencies primarily related to weekends, followed by location, holidays and the respective season. Mobile phone positioning data allowed for monitoring larger areas and establishing specific visitor profiles.


Camera traps on the other hand allowed for revealing small scale variations and identifying main user profiles. A comparison of both datasets showed high correlations for some areas, though smaller correlation for others.

A main issue for mobile phone data was the large cell size of the operator network, which did not allow for distinguishing in a 100% accurate way between nature and non-nature visits. Also the cost of acquiring this data is significant. The main issue related to camera traps was the importance of its positioning and the lower precision for non-persons. Future improvement might a.o. concern the inclusion of a self-learning process in the model to improve precision. Both methodologies provide substantially more accurate data, quantitatively as well as qualitatively, on nature-based tourism and recreation, compared to the traditional statistics available for our case study area. The insights obtained from this study could help site managers and policy makers in decision-making processes on sustainable natural resource management. For example, nature reserves are traditionally set aside areas without public access. However, the ambition to increase the number of reserves, and the reported over-frequentation of other nature sites, opens the question of public access to nature reserves (Dufrêne, 2018). Information on visitor frequencies, behaviour and the proportion of infractions of similar sites elsewhere, can help to determine which sites to open to the public or not.

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# 62 Assessment and accuracy improvement of monitoring of tourism traffic in a mid-mountain national park (MSTT: Monitoring System of tourist traffic) in Stołowe Mountains National Park, SW Poland

**Krzysztof Piotrowski**, **Mateusz Rogowski, Adam Mickiewicz**, Univerisity in Poznan, Chair of Tourism and Recreation, Poland

The sustainable management of vulnerable natural areas requires accurate measurement of visitor flows, especially in protected natural areas (Andersen et al. 2013). According to Andersen et al. (2013), the most often used counting system is a pyroelectric sensor that features a lens sensitive to heat radiation emitted by the human body (Eco-Counter model: PYRO sensor). An important challenge with automatic counting systems is their accuracy, since all types of counters are subject to counting errors (Pettebone et al. 2010).

This study focuses on visitor counting accuracy in national parks situated in mountain areas that are also one of the most popular tourist areas. It illustrates the attention to detail required to carry out accurate visitor counting. The purpose of the study was to evaluate the accuracy of pyroelectric sensor measurement errors in relation to different visitor flow levels and different time intervals between visitors. This verification was based on field experiments and on-site observations of the pyroelectric sensors working as part of the Monitoring System of tourist traffic (MSTT) in Stołowe Mountain National Park (SMNP) in Sudety Mountains, southwestern Poland. SMNP is visited by about 900,000 tourists per year. (Rogowski 2020). In mountain areas, it is difficult to collect data over a longer period of time. In addition, field and weather conditions may yield a higher error rate. This evaluation of accuracy was performed to yield calibration formulas.

Methods

The data presented in this paper were collected in the summer seasons 2018 and 2019. PYRO Sensors by Eco Counter devices (called later pyroelectric sensor), with its passive-infrared, pyroelectric technology and a high-precision lens, counts people passing within the range of its sensor by detecting their body temperature. The pyroelectric sensor takes into account the direction of movement. In the configuration used for testing, data were recorded every hour. In a situation where the observer is equipped with a mobile device within Bluetooth range, it is possible to view the counts in real time.

Pyroelectric sensor accuracy was investigated in three steps:

1. A field experiment aimed to determine how the number of volunteers passing continuously and with various time gaps in front of the sensor affects the count result,
2. On-site observation in Szczeliniec Wielki of how the sensor works in visitors flow,
3. Calibration formulas based on field hourly measurements were then generated.

Pyroelectric sensor data analysis concentrated on the following variables: each visitor's passing configuration, time intervals between passing visitors, number of visitors in groups.

Results

The field experiment provided the following results:

1. The studied pyroelectric sensor can both overcount (visitors walking continuously) and undercount (1-second time gap),
2. For the passage of more than 6 persons walking continuously, generated errors occur in the range from 10.0% to 21.4%;
3. For passages with shorter than 3-second time gaps between persons walking by, a generated average errors occurs from 2.8% (2-second time gap) to 16.1% (walking continuously).

On-site observation provided results as follows:

1. Ratio of incorrect measurements and average error size increase with increasing number of persons walking by continuously,
2. In groups smaller than 6 persons per passage, an error occurred in the process of real-world conditions observation, although not in the field experiment,

3. In a group as small as 2 or 3 persons per passage the average error ratio is 18.3%. While in a group with 4 to 10 persons, the error ratio was 11.9%, and in a group with over 10 people per passage – it was 15.5%,
4. The highest number of, and biggest error size for, incorrect measurements happened around midday (from 11 a.m. to 2 p.m.) and reached from 50% to 68% of total hourly measurements. In this period of time, the density of visitors was the highest, and reached > 200 visitors per hour,
5. At a high visitor traffic site (> 200 visitors per hour) during one day of observation the studied sensor overcounted by 14%.

The analysis of the causes of errors of the pyroelectric sensor provided the basis for a typology of error circumstances gave the ground to generate the typology of error circumstances: the main factor of error occurrence was density of visitor flow, but also visitors passing simultaneously in both directions, the difference between the temperature of the human body.

In the course of the field experiment and on-site observation, unique situations were noted, which were related to errors made by the studied sensor: opposite-direction counting, fatigue effect and impact of higher air temperature on counting errors.

The calibration formula produced in the present study is as follows: $y = 0.9416\ x – 5.401$. The formula may be used for groups of at least 20 persons per hour. This calculation is based on hourly observation data from manual counting and pyroelectric sensor counting. For data obtained in real-world conditions, the original overall error rate was 12.6%. By using the proposed calibration formula, the estimated overall error rate becomes 6.3% (tab. 1).

Follow up

The calibration formula discussed in this study was used to process pyroelectric sensor data generated by MSTT, a system used to monitor visitor flow in Stołowe Mts. National Park. The said formula represents one potential way of using data from MSTT for sustainable tourism management in a middle mountain national park (Rogowski 2020). Finally, the said calibration formula is simple and universal

*Tab. 1 Calibration of measurements based on calibration formula*

| | *Average error size* | *Error standard deviation* | *Average error rate* |
|---|---|---|---|
| **Pyroelectric sensor counting** | 16.1 | 13.3 | 12.6% |
| **Calibration result** | 8.3 | 6.6 | 6.3% |

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# 67 Comparing landscape value patterns between participatory mapping and social media content across Europe.

**Anton Stahl Olafsson[1], Ross S. Purves[2], Maria Garcia-Martin[3], Flurina Wartmen[4], Nora Fagerholm[5], Mario Torralba[6], Christian Albert[7], Laura Verbrugge[8,9], Vuokko Heikinheimo[10], Rope Kaaronen[9], Maximilian Hartmann[2], Tobias Plieninger[6,11], Christopher Raymond[12,13,14]**, [1]University of Copenhagen, Dep of Geosciences and Natural Resource Management, Denmark. [2]Department of Geography, University of Zurich, Switzerland. [3]Swiss Federal Research Institute WSL, Switzerland. [4]Geography and Environment, University of Aberdeen, Scotland, United Kingdom. [5]University of Turku, Department of Geography and Geology, Finland. [6]Faculty of Organic Agricultural Sciences, University of Kassel, Germany. [7]Institute of Geography, Ruhr University Bochum, Germany. [8]Helsinki Institute for Sustainability, Finland. [9]Science (HELSUS) and Faculty of Agriculture and Forestry, University of Helsinki, Finland. [10]SYKE, Finland. [11]Department of Agricultural Economics and Rural Development, University of Göttingen, Germany. [12]Helsinki Institute for Sustainability Science (HELSUS), University of Helsinki, Finland. [13]Ecosystems and Environment Research Program, Faculty of Biological and Environmental Sciences, University of Helsinki, Finland. [14]Department of Economics and Management, Faculty of Agriculture and Forestry, University of Finland, Finland

Visitor monitoring and mapping techniques are rapidly evolving fueled by open georeferenced data and social media opportunities. Knowledge on how visitors use and value landscapes is increasingly elucidated by social media data or user-generated data passively contributed by online communities. Examples of this is the use of data from social media such as Flickr, where users share and store geocoded images in an online platform. Here images, locations and associated tags is opportunistic crowdsourced by researchers and planners to conceptually and spatially elicit landscape values such as cultural ecosystem services and relational values.

At the same time, integrated landscape planning and management has increasingly focus on planning ideals of deliberative processes, co-creation and inclusion of diverse values. Examples of this is participatory mapping techniques aimed to support the inclusion of diverse values held by residents and visitors into integrated landscape management. By the use of online public participation GIS (PPGIS), participants are actively recruited to purposely map socio-cultural values about specific landscapes.

The values data collated using active participatory mapping techniques and passive user generated data is rarely compared. In this study, we bring PPGIS and Flickr together in an exploration and discussion of the similarities and differences. In contrast to previous comparative studies focused on single study site, we expand the analyses from a single site to cross-site analyses of 19 landscapes across Europe (in 11 countries). We argue that in order for planners to harness the qualities of both – we need to place a spotlight on strengths and shortcomings of each method and core opportunities for complementary use. We do this by a direct comparison of the spatial distribution, intensity and type of landscape values elicited using PPGIS and Flickr data. Moreover, we relate similarities or differences to specific landscape characteristics and types of landscape values.

We find great variety in volume, types and spatial pattern of landscape values elicited from PPGIS mapping and Flickr across study sites in Europe. The most agreement in spatial patterns is in the most densely populated landscapes, but for most of our study sites, we only find low spatial overlap and poor or no spatial relationship to landscape variables known to relate to landscape values. This indicate that using Flickr and PPGIS data to designate particularly valued parts of a landscape might result in significant different spatial results, particularly in less populated landscapes.

In order to elicit landscape values from Flickr, we coded tags according to basic landscape forms, practices and relationships. This resulted in different distribution of values between study sites as revealed by Flickr tags. We compared and discussed this result according to frequency of landscape values mapped by PPGIS participants. Although, the values used in the PPGIS investigation mirrored basic landscape forms, practices and relationships, we found poor or no direct relationship between

frequencies of values elicited by the two approaches. We conclude that PPGIS and Flickr is two fundamental different systems of collecting landscape value data rooted in different ontologies and epistemologies that are hard to compare and might result in contrasting results. We recommend a complementary use that potentially might increase the inclusiveness of different people involved in landscape value assessments.

## 86 Critical comparison of social media and other user-generated geographic information as a source of visitor information – lessons learned in the SoMeCon-project

**Vuokko Heikinheimo[1,2]**, **Tuuli Toivonen[2]**, [1]Finnish Environment Institute SYKE, Finland. [2]Digital Geography Lab, University of Helsinki, Finland

Up-to-date information about outdoor recreation experiences is important for the planning and management of national parks and other outdoor destinations. User-generated data such as geotagged social media posts and GPS-tracks shared via sports applications have emerged as potential new data sources to complement on-site counters and surveys. There are considerable amounts of geographic information available from digital platforms and mobile devices representing the movements, activities and preferences of visitors, and these data have been increasingly used for studying visits to national parks and green spaces..

This presentation draws together our findings from the Social Media Data for Conservation Science –project SoMeCon (2016-2021). Our main objectives were to 1) gain methodological understanding about social media and other user-generated data sets as a source of geographic information, and 2) to provide new information about the spatial and temporal patterns of human activities in national parks and green spaces. We compared social media data to official visitor statistics from Finnish and South African national parks, and social media to other sources of user-generated geographic information (sports app data, mobile network data, PPGIS data) from urban green spaces in Helsinki, Finland.

We provide an overview of methods that are useful for analyzing the spatial and temporal dimensions of user-generated data as well as the rich visual and textual content (Toivonen et al. 2019). We also discuss the limitations related to data quality, limited access as well as privacy issues. On the one hand, anonymized and aggregated data products are one way forward regarding ethical analysis of user-generated geographic information. On the other hand, data minimization and pseudonymization already at the data collection phase helps to overcome some issues related to protecting personal information (Di Minin et al. 2021; Sandbrook et al. 2021).

Comparisons between social media data and official visitor information support the use of social media data as an indicator of park visits and visitor preferences to some extent. In popular parks, temporal changes in social media posting activity reflect changes in measured visits, while in less visited and remote parks the social media posting patterns are more sporadic and irregular (Tenkanen et al. 2017). We found similar trends in both social media content and visitor surveys regarding popular activities and visited places (Heikinheimo et al. 2017; Hausmann et al. 2018). Social media photos may reveal also seasonal patterns in the landscape (like snow cover) and how the activities change by the season. Automated analysis approaches such as computer vision methods offer new opportunities for summarizing such information from vast quantities of data (Väisänen et al. 2021).

Our comparisons among social media data, sports application data, mobile phone data and participatory geographic information from urban green spaces highlights the questions to which each data source can contribute to (Heikinheimo et al. 2020). Data from social media platforms reflects enjoying and being in nature, sports app data and mobile network data reflect more precise movements during a visit or a daily commute. PPGIS data are useful for capturing values and preferences more in depth from a targeted sample. Each data source has its limitations regarding data access, spatial and temporal extent and metadata availability.

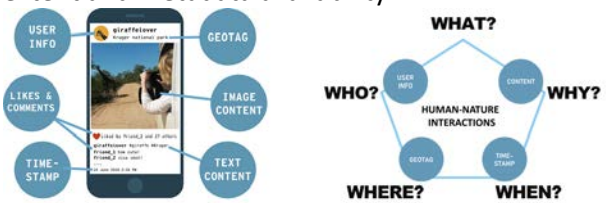


*Figure 1. Various elements of user-generated geographic information offer novel perspectives for understanding the spatio-temporal patterns of human activities in nature.*

Overall, user-generated geographic information offers valuable insights about where, when and how people use and value nature (Figure 1). Combining information from several sources provides a more comprehensive understanding of green space use and preferences. In areas outside official visitor monitoring schemes, user-generated data might be the best available information about the movement and activities of people. Even if these user-generated data sources are imperfect measures of nature's contributions to people, they are still better than ignoring the value of to human well-being completely. Novel data sources such as social media photographs or traces from mobile network data should be used to complement, not to replace, existing high-quality visitor monitoring schemes.

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## 98 Triggered trail camera images and machine learning based computer vision as alternative to established visitor monitoring approaches?

**Marius Mayer**[1], **Jeroen Staab**[2,3], **Erica Udas**[4,5], **Hannes Taubenböck**[2,6], [1]University of Innsbruck, Austria. [2]German Aerospace Center (DLR), German Remote Sensing Data Center (DFD), Germany. [3]Humboldt-University Berlin, Geography Department, Germany. [4]International Center for Integrated Mountain Development (ICIMOD), Nepal. [5]University of Greifswald, Institute of Botany and Landscape Ecology, Germany. [6]University of Würzburg, Germany

Visitor monitoring is crucial for many management and valuation tasks in protected areas and other recreational landscapes. Its core data are visitor numbers which are costly to estimate in absence of entry fees. Camera-based approaches have the potential to be both, accurate and deliver comprehensive data about visitor numbers, types and activities. So far, camera-based visitor monitoring is, however, costly due to time consuming manual image evaluation (Miller et al. 2017). To overcome this limitation, we deployed a convolutional neural network (CNN) and compared its hourly counts against existing visitor counting methods such as manual in-situ counting, a pressure sensor, and manual camera image evaluations.

The study site is Eldena Forest Nature Reserve (EFNR), which is located at the southeastern rim of the city of Greifswald, Germany. The forest is owned by Greifswald University and is spread over 411 ha. Given its close vicinity to the city of Greifswald, EFNR is frequently visited; however, exact visitor numbers have never been estimated so far (Udas et al. 2018). There are seven major entry points into EFNR, and based on the communication with local foresters, the entries at A, B, C and D are the ones mostly used due to their proximity to residential areas.

The methodology is explained in detail in Staab et al. 2021. While conducting systematic visitor monitoring in EFNR, three different visitor counting methods were deployed at different entrances in 2015. At all seven entrances, manual in-situ visitor counting was carried out as a fundamental benchmark following a visitor counting method used in many protected areas (Mayer et al. 2010). To determine the annual cumulative number of visits in EFNR, the actual data from the sampled days were extrapolated. The extrapolation procedure accounted for seasonality, weekends/weekdays and the weather situation and is a standard procedure used by many studies (Mayer et al. 2009). In addition, at one of the most frequented entrances, entrance A, a pressure sensor was installed to capture the seasonal variation of visitation, and triggered trail cameras were installed at entrances B, C, D and E. The images were first evaluated manually using three semantics of image interpretation to estimate visitor numbers. The number of visitors entering the EFNR was documented on an hourly basis for each day in a spreadsheet. Regarding the automated image analyses, advanced computer vision technologies such as deep CNNs can detect pedestrians at very high accuracies. We used a pre-trained image analyzing framework developed by Redmon et al. (2016), respectively Redmon & Farhadi (2017, 2018) and, as its name indicates, You Only Look Once (YOLO) is very fast in grasping an image's content. As a result of the versatile training data, the pre-trained algorithm detects several object classes in an image, among which are persons, bicycles, backpacks and dogs – categories of special interest to characterize visitors in recreational landscapes. We directly compared the results of all counting approaches. For each entrance the raw, hourly results per counting approach were set against each other. The statistical deviations were measured using Pearson's correlation and a linear model without intercept.

At entrance A, where manual in-situ observations were conducted next to the pressure sensor on five days, we found a strong and highly significant correlation (0.783, $p<0.001$). The respective linear model fitted through the 50 hours of simultaneous observations further revealed that the automated approach does account for 88.4% of the visits counted by the manual in-situ observer (adj. $R^2$ = 0.799, $p<0.001$).

Regarding the other two entrances where manual in-situ counting was conducted along with ongoing

camera observations, only the manual and YOLO camera evaluations at entrance B correlate significantly with the corresponding 44 hours of manual in-situ observations due to too low sample size at entrance C. However, the regression models comparing the two camera evaluation approaches against manual in-situ observations are significant at entrances B and C.

When comparing the automated and the manual image evaluations of entrances B-D against each other, both approaches strongly correlate at very high significance levels (Ør = 0.818, p<0.001).

Further, the results of the automated image evalutation also often correlate significantly but with low to medium strength to the in-situ personal counts and the pressure sensor at the other entrances. This shows that YOLO is able to reflect the visitation trends over the year even though observations did not always take place exactly at the same locations.

Thus, the results show that the CNN derived comparable visitor numbers to the other visitor counting approaches regarding visitation patterns and numbers of visits. Therefore, we conclude that it is a fast and reliable method that could be used in protected areas as well as in a much wider array of visitor counting settings in other recreational landscapes. The approach also allows for counting dogs and recreational equipment such as backpacks and bicycles in automatic manner. While the accuracy of these categories has not been assessed yet, we suppose this new monitoring approach shall help managing particular user groups and helps avoiding conflicts in such recreational areas. Nevertheless, camera installation takes time and effort, regular maintenance (batteries, storage cards) and the automated evaluation requires specific hardware and expertise as well. Along ethical and legal concerns, other practical issues are theft, vandalism and the short lifespan of batteries, especially in the winter season.

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# 180 Using web share services to monitor high sensitive habitats. A GIS approach to Pedraforca, Spain.

**Ricardo M. Nogueira Mendes[1,2]**, **Estela Farías-Torbidoni[2]**, **Serni Morera[3]**, **Victor Dorado[2]**, [1]CICS.NOVA, NOVA FCSH, Portugal. [2]GISEAFE, INEFC-UdL, Spain. [3]Autonomo, Spain

**Introduction**

Over the last decades, recreational uses in Natural & Protected Areas (N&PA) have increased largely all over the world, requiring extra efforts among staff and management teams of these territories to deal with this reality. In many places, nature conservation has somehow even been replaced by tourism management due to social and economic factors altogether with the massification of visitors. Modern lifestyles have contributed to this situation where visitation peaks concentrate within short periods such as Holy Week, summer, or winter vacations depending on local culture and social habits. Quite often these visitation peaks largely exceed any ecological or social carrying capacity becoming a delicate subject to deal with, reducing in many cases the administration of N&PA to the management of visitors' crowds and traffic.

One of the situations that happen due to overuse is the proliferation of trails that can lead to ecological and soil impacts from erosion, roots/bare rock exposure to changes of species, or habitat fragmentation, among others. Even in N&PA with a well-structured trails network, the proliferation of variants of trails and paths can easily happen, becoming a serious problem for managers due to its ecological impacts but also due to risk and safety issues for visitors/users. Keeping tracking and monitoring trails proliferation is a demanding task, where technology such as high-resolution imagery or digital elevation models can provide a huge help. Nevertheless, although these data sources become more affordable and widely available they might not work for all places. In this paper, we discuss the use of smart data and technologies as a potential tool to provide new insights on how to deal with this issue by taking advantage of web-share platforms and a myriad of GPS tracks – what can be acknowledged as an advantage of modern uses of N&PA.

**Study Area and Datasources**

Pedraforca is one of the most famous and iconic mountains in Catalonia, the northeasternmost region of Spain. Located in the Pre-Pyrenees region with a 2506m summit, Pedraforca is not visibly connected to any other adjacent mountains or ridges being classified under Natural Area of National Interest (1982), Special protection zone for Birds (1987), area of the Alpine region - Natura 2000 Network (2003) and Natural Park of Cadí-Moixeró (2004) (Figure 1). The last available estimations from Faías-Torbidoni & Morera (2019) point to a total of 345000 visitors/year for the entire park with one-third focusing around the Pedraforca Sector (Figure 1-a). Seasonal use of Pedraforca massif (Figure 1-b) typically spreads over three periods - Holly week, August, and October/November and core visitors are from the surrounding regions, with 2/3 coming from the province of Barcelona. Visitors arrive manly by car (85%) and sightseeing, soft walks, trekking, mountaineering, and climbing are the main attractions to this sector. Although that the park touristic guide suggests only one circular route around the mountain (Pedraforca 360º - PRC-127), it's is commonly accepted that there are 7 routes around this area starting from the nearest villages of Gósol and Saldes, ranging from 2,38 up to 16,86 km in length and taking between 1:30 to 8:00 hours to be completed.

Although four main trails lead to the summit from Gósol, Tartera de Saldes, and Mirador de Gresolet, official cartographic products show no trails or paths in the summit area (Figure 1-c). A quick search around web-share services such as AllTrails.com or Wikiloc.com can lead to over 5000 GPS tracks just for trekking and climbing around this sector (Figure 1-b and 1-d).

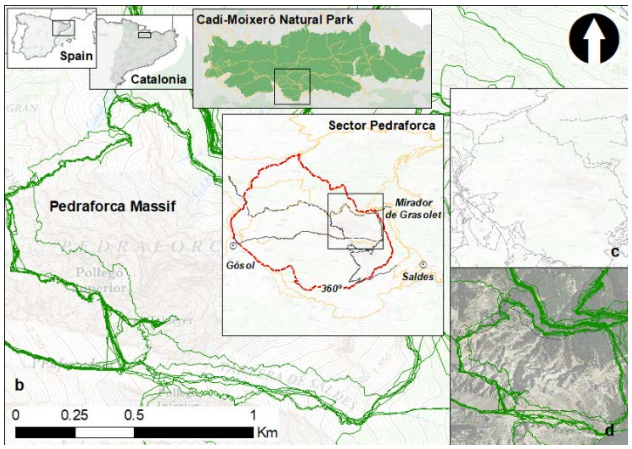


*Figure 1 – Study area. Location of Cadí-Moixeró Natural Park. a) Pedraforca Sector and Route 360º - PRC-127; b) Pedraforca Massif and web-shared GPS tracks; c) Pedraforca Sector and official cartographic trails and paths from Institut Cartogràfic i Geològic de Catalunya; d) Detail of Pedraforca summit and web-shared GPS tracks.*

**Preliminary Results and Discussion**

A detailed analysis of the summit area shows that most of the GPS tracks are concordant with the main routes, meaning that most visitors comply with the desire trails network. Nevertheless, off-trail exists in some cases with trekkers moving over 150m from the trail what could jeopardize any rescue mission if needed. Regarding the proliferation of trails variants, the Tartera de Pedraforca is the path that suffers most from this issue. While most of the spacing of the tracks is within typical GPS error (10 to 30m), here these spread over 120m, reaching the entire width of the Tartera that includes fragile habitats such as scree and Festuca gautieri pasture. By 2009 severe ecological and trails impacts were already reported when trail users were around 16500/year (Tor & Soriano, 2011).

Web-share services have been extensively explored and used to monitor recreational activities over the last decade, taking advantage of the new relationships that healthy lifestyles and technological gadgets such as smartphones, smartwatches, and APP have produced in how visitors and users related with N&PA. Detail scale analysis under Geographic Information Systems has been used to show where and when users move, providing spatial behaviors from different activities with accuracy. Prices related to GPS units from 15/20 years ago have lower so much that each visitor can be a provider of Volunteer Geographical Information (Goodchild, 2007), but this does not happen. This doesn't mean that these data sources are all biased – as with any sampling strategy assumptions must be made to make good use of this information. Questions must always be raised considering technological limitations and positional errors due to many facts. Last, but not least, trends around lifestyles and social media such as web share services and many others are continuously changing requiring even more parsimony in the use of these technologies – that should always be coped with classic and well-established methods.

**Acknowledgments**

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# 104 Nature-based tourism experiences between mobile connectivity and the freedom of disconnecting

**Eugenio Conti**[1,2], **Ioanna Farsari**[1], [1]Dalarna University, Sweden. [2]Mid Sweden University, Sweden

Mobile Internet connectivity is traditionally seen as an experience enhancer in tourism, and extant research in the context of natural and protected areas show a positive attitude towards such technology. On the visitor experience's side, it enhances safety, information retrieval, connectivity to peers and accessibility (Elmahdy, Haukeland and Fredman, 2017). On the destination management's side, it constitutes a resource for visitor planning, monitoring and engagement (Pickering, Chelsey, Barros and Rossi, 2020; Hausmann et al., 2017).

Recent studies are discussing more critically whether ubiquitous connectivity always represents a resource for tourism or conversely a factor that jeopardizes the tourism experience by triggering pressures, discomfort as well as estrangement from local communities and places (Egger, Lei and Wassler, 2020). The issue is particularly important within nature-based tourism, due to its relation to experiential themes of genuineness, detoxification and escapism and its localization in areas where transformational and educational experiences are prioritized (Li, Pearce & Low, 2018).

Most research on the topic examines mobile connectivity and disconnection from it in dichotomizing approaches. However, the reality of the phenomenon is largely subjective. Ambivalent results leave the question of the value of ubiquitous connectivity in nature open (Dickinson et al, 2016).

We contend that traditional research approaches are unable to fully grasp the complexity of the connectivity-disconnection dilemma in nature, especially in terms of how tourists negotiate between connectivity and disconnection on-site and the experiential meanings that are attached to such negotiation. We should not assume that ubiquitous connectivity is always a "smart" experiential factor in natural and protected areas, sought or expected by visitors and/or leading to increased visitor satisfaction, engagement, or value (Neuhofer, 2016). At the same time, we dispute the similarly aprioristic association of experiences in nature as in "technology-dead" places, where a total disconnection from ubiquitous connectivity is sought and where, consequently, the development of an enabling infrastructure should not be pursued by nature-based destination stakeholders (Li, Pearce & Low, 2018; Pearce & Gretzel, 2012). Other than simplistic in experiential terms, we find this notion problematic because it potentially reinforces unequal and dispossessing dichotomies between "smart" hyperconnected urban areas and, specularly, disconnected and underdeveloped rurality.

Having this in mind, this research adopts an interpretive approach and investigate subjective negotiations of connectivity and disconnection through 19 formal field group interviews collected at the visitor centre of Fulufjället National Park, Sweden. In formal field group interviews, the researcher stages a setting on the field to help natural group dynamics to play out. Thus, our groups were not arranged by us and were constituted by tourists touring the park together. Formal field group interviews allow the researcher to be an empathic observer but also a proactive enquirer and are best suited for naturalistic and exploratory research questions (Frey & Fontana, 1991). Groups varied from a minimum of 2 to a maximum of 6 people, with an average of 2-3 participants per interview. Participants encompassed different European nationalities, including Swedish, except for a group from Israel.

Results reflect the necessity to overcome the dichotomy between connectivity and disconnection in nature-based tourism and expand its theoretical understanding by focusing on tourists' interpretations of what connectivity, and by extent dis-connectivity, means in relation to their lifeworld (Gibbs et al., 2015; Verkasalo, Nicolás, Molina-Castillo and Bouwman, 2009). Thus, we introduce the concept of existential disconnection as a way to further characterize the features of disconnection in the tourism experience and its negotiation with connectivity. We characterize disconnection as an existential feeling of freedom and control of mobile-based connectivity apps and functions, which contrasts with the constraints and pressures associated with the meanings

of the same apps and functions as experienced in daily life. Importantly, disconnection in nature is experienced similarly across different visitors ranging from technophobic to technophilic. It can exist even in the absence of an objective detachment from mobile devices, as long as the freedom from connectivity experienced in the urban environment of daily life is experienced. In other words, most tourists experience disconnection when they feel the freedom to enact personal forms of connectivity other than when connectivity itself is absent.

We draw managerial implications for destination stakeholders in rural, natural and protected areas concerned with the role of mobile connectivity in nature-based tourism. Mobile connectivity represents an opportunity for monitoring visitors of natural areas, but external pressures to encourage visitors to "keep connected" may be harmful. Yet, natural areas should not be treated as "technology-dead" areas, not least because the escapism experienced by disconnecting does not necessarily imply the absence of mobile connectivity. Information retrieval can be encouraged by developing services based on mobile devices without requiring high-speed Internet. Voluntary visitor services and guidelines can be developed centred on the benefits of disconnecting from specific apps in nature while keeping devices ready for emergencies, monitoring or guidance. Non-invasive connectivity, more than the absence of connectivity, can help visitors with health conditions or impairments in feeling safe and free to experience disconnection.

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# Recreation and tourism monitoring under increased pressure: Practical tools and approaches for sustainable management

| SESSION | PART | DATE | TIME | CHAIRS |
|---|---|---|---|---|
| 5B | - | Wednesday 18th August | 15.40 – 17.00 CET | Francisco Javier Ancin-Murguzur |

| | Programme |
|---|---|
| | **57** The MEET Standard for Ecotourism Products. Improving tourism offer quality and sustainability in Protected Areas |
| *5B* | **129** Tourism overuse indicators system for protected areas and buffer zones |
| | **79** Recreation and tourism monitoring under increased pressure: practical tools and approaches for sustainable management |
| | **140** Investigating the outcomes of personal interpretation and extending the psychological factors of the Theory of Planned Behaviour |

# 57 The MEET Standard for Ecotourism Products. Improving tourism offer quality and sustainability in Protected Areas

**Cristina Casals Miralles[1], Mercè Boy-Roura[1], Joan Colón Jordà[1], Carla Danelutti[2], Arnau Teixidor[2], Natalie Beckett[2], Alessandro Galli[3], Serena Mancini[4], Debora Barioni[3]**

[1] BETA Technological Center, University of Vic – Central University of Catalonia (UVic – UCC), Spain. [2] IUCN Centre for Mediterranean Cooperation (IUCN-Med), Spain. [3] The Global Footprint Network (GFN), USA. [4] The Global Footprint Network (GFN), Spain

MEET is a network of Protected Areas working to guarantee biodiversity protection via revenues generated by ecotourism activities in and around Protected Areas (PAs). The MEET Standard for Ecotourism product development, developed during the DestiMED project and adopted by the MEET Network, is an integrated approach to guide Protected Areas destinations in the management of the quality and sustainability of the ecotourism products offered to tourists. This Standard has been conceptualized, tested, and fine-tuned within several EU-funded initiatives (Meet, Destimed, DestiMED PLUS) thus becoming comprehensive monitoring of ecotourism products developed in a Protected Area destination. Specifically, the MEET Standard deals with all the relevant aspects necessary to set-up ecotourism offer in Protected Area destinations, from assessing tourism governance and conservation within the Protected areas to the quality of ecotourism product design and development; from the assessment of the product's Ecological Footprint, to the evaluation of the socio-economic performance of the service providers involved in the ecotourism product. To simplify the organization of all the different components, MEET standard has been organized in two main pillars: the first one evaluates the Enabling conditions around governance and park management existing at Protected area scale, while the second pillar, named the Product pillar, address the quality and the sustainability of the ecotourism product developed by the Protected Area. In view of the many and variable components addressed by the MEET standard, a common methodology for the aggregation and comparison of results is also being developed, so that the final users can easily evaluate the performance of their destinations. The methodologies used are different for the various types of components and related indicators developed. For socio-economic indicators, the Product Social Impact Assessment methodology (PSIA) has been followed, to assess the positive and negative social impacts of products and services along their value chain (Social Life Cycle Assessment). Governance and conservation indicators were developed on the basis of the IUCN Green list standard for Protected Area management and IUCN's Natural Resources Governance Framework. For Product Development, indicators are used to ensure that the products include certain requirements considered important in an ecotourism product framed in a protected area such as the design of the product consistent with regulations of the PA. Indicators related to Product Quality are focused on measuring and managing the overall quality of the tourism product since in addition to being sustainable it must be suitable for marketing and were developed on the basis of the experience and on the ground tests implemented in more than 30 Protected Areas during the course of different projects. Finally, the Ecological Footprint allows quantifying the tourism pressure on ecosystems by measuring the renewable natural resources and ecological services demanded because of tourist consumption activities. The result of this work is an integrated standard to assess all the components leading to the set-up of an ecotourism offer in a Protected Area destination and an associated indicators system to compare and aggregate results, and provide benchmarks for improvement. Currently being tested in nine pilot actions located in nine different protected areas of the Mediterranean basin in the framework of the DestiMED PLUS project, this standard will help assess and improve the performance and management of tourism in protected areas. It will be associated with a monitoring platform that will allow for a simpler visualization of results by the Protected area staff

responsible for ecotourism development in the area
as presented in Fig. 1.

## 129 Tourism overuse indicators system for protected areas and buffer zones

**Michael Moya Calderón[1,2], Carlos Alfredo Barriocanal Lozano[1,3], Eduardo Carrillo Jiménez[4]**, [1]Autonomous University of Barcelona, Spain. [2]University of Costa Rica, Costa Rica. [3]University of Barcelona, Spain. [4]National University of Costa Rica, Costa Rica

There are considerable national parks and other protected areas around the world that are attracting a huge number of visitors annually. In many cases the tourist visitation can be highly concentrated both spatially and temporally leading to the generation of impacts in different directions in social, economic, environmental, technical areas not only within the protected area but also in its buffer zone. Because of this situation and the absence of specific indicators to manage tourism overuse, this study aims to develop a proposal of indicators and sustainability index of tourist frequentation to determine the impact of ecotourism associated with protected areas and buffer zones of high tourist demand. The selection of indicators was carried out after a systematic process consisting of: (i) identification of the problem to be evaluated, (ii) definition of indicators and their variables, (iii) selection of indicators, (iv) definition of criteria for indicator selection, (v) selection of indicators, (vi) design of indicators, (v) validation of indicators using the Delphi method. As a result, there are a set of 32 indicators that take into account areas such as natural resources, community, visitors, protected area management, and tourist operation. The proposal includes an Approximate Tourism Visitation Sustainability Index (AToViSI) which varies between 0 and 1 according to the degree of sustainability determined. The proposal collaborates in the management (both internally and externally) of protected areas to generate mechanisms or strategies towards the sustainability of the tourist destination. The COVID-19 pandemic is an opportunity to improve visitor management and not make past mistakes or at least mitigate and guide adaptive management to more sustainable conditions in areas of high tourist attraction.

# 79 Recreation and tourism monitoring under increased pressure: practical tools and approaches for sustainable management

**Francisco Javier Ancin-murguzur[1], Christopher Monz[2], Noah Creany[2], Lorena Munoz[1], Ashley D' Antonio[3], Abigail Sisneros-Kidd[4], Aleksandra Tomczyk[2], Marek Ewertowski[2],** [1]UiT The Arctic University of Norway, Norway. [2]Utah State University, USA. [3]Oregon State University, USA. [4]University of Wyoming, USA

This session will be organized as a discussion panel with short introductory presentations (approx. 15-20 minutes) and a discussion after each presentation, first between the panelists, and afterward opened to the public. We will cover an integrative view of the available technological tools to monitor visitor impacts on protected areas and their relationship with visitor preferences on nature (i.e., cultural ecosystem services). With the increased visitation to nature, especially to parks and protected areas (PPA), there is a growing need for tools that allow rapid gathering of data regarding the visitor preferences in PPA and their impact on the landscape. The session aims to achieve an overview of how the complexity of the combination of increasing visitation with degradation of natural features can be addressed by integrating different methods.

In this session, we will focus on how modern tools can improve the monitoring and management of visitor preferences and impacts. We have contacted participants with a strong multidisciplinary background, with experience from method development to hands-on management. First, we will focus on methodological aspects, emphasizing social media and mobile apps as a tool to retrieve geolocated information on user preferences, and the applicability of drones on monitoring of human impacts. Second, we will address the management consequences of increased recreation and tourism visitation and discuss how we can integrate the monitoring tools and the obtained results into spatial planning to reduce conflicts and ensure long-term conservation of the PPA. The session will end with an open discussion together with the listeners.

**Session part 1:**

We will cover methodological opportunities for visitor monitoring. We will present and discuss established visitor tracking methods such as GPS tracking of individual tourists and trail counters or game cameras. We will expand the presentation with the possibilities of passively generated data by recreational users of activity-logging apps such as Strava. We will also discuss how we can obtain tailored spatial data from areas of interest using high-resolution imagery obtained from overlapping photographs using Structure-from-Motion (SfM), both from aerial photographs (i.e., drones) and hand-held cameras.

There will be a short conversation over how these methods can be combined to take advantage of their strengths, together with the potential new applications of these methods.

**Session part 2:**

We will present how the methods mentioned in the first part of the session can be integrated by managers to improve their practices. The session will continue towards management challenges in spatial planning (e.g., fragmented habitats, protection of endangered species or infrastructure development) and the use of collaborative processes for integrating public input and values into sustainable recreation management practices.

There will be a short conversation integrating the main conclusions from this part of the session, followed by an open discussion with the audience.

*We strongly encourage the audience to pose questions and comments.*

# 140 Investigating the outcomes of personal interpretation and extending the psychological factors of the Theory of Planned Behaviour

**Clara-Jane Blye**, **Glen Hvenegaard**, **Elizabeth Halpenny**, University of Alberta, Canada

**Introduction**

Environmental interpretation can help mitigate the negative impacts of recreation, tourism, and human use of parks and protected areas. Interpretation is a mission-based approach to communication aimed at provoking in audiences the discovery of personal meaning and the forging of personal connections with things, places, people, and concepts (Ham, 2016). Personal interpretation enhances enjoyment of visitor experiences (Stern et al., 2011), increase visitors' knowledge and understanding of natural and cultural resources (Ham, 2016), foster a sense of appreciation toward those resources (Powell et al., 2009), and promotes stewardship behaviors (Ham, 2016). Importantly, interpretation can be an effective management tool for parks to mitigate and influence visitor behaviours (Marion & Reid 2007). This study sought to determine, based on a case study of Alberta's Provincial Parks, the outcomes of personal interpretive programs and the factors influencing those outcomes.

As a major goal of interpretation is behavioural change, this study employed Ajzen's (1991; 2011) Theory of Planned Behaviour (TPB) which suggests that behaviour is best predicted by a person's intention to perform a specific behaviour, and this in turn is explained by attitudes, subjective norms, and perceived behavioural control associated with the behaviour in question. The TPB performs well in predicting a wide range of behaviours and behavioural intentions including environmental behaviours (Vagias et al., 2014).

This study not only investigated the efficacy of environmental interpretation on influencing pro-environmental behaviour intentions, but also expanded on the theoretical constructs making up TPB. As such, motivations, satisfaction of visit, knowledge, and environmental worldview were included. The additional psychological constructs were included in the proposed theoretical model based on previous studies focused on environmental interpretation and pro-environmental behaviours (Moghimehfar & Halpenny, 2016; Vagias et al., 2014).

This study examined the following hypotheses: (1) Attending in-person environmental interpretation programs increases park visitors' intentions to engage in pro-environmental behaviours; (2) The TPB variables (e.g., perceived behavioral control, attitudes, and social norms) help predict park visitors' pro-environmental behavioural intentions; and (3) Motivations, satisfaction of visit, environmental knowledge, and environmental worldview improve the prediction of pro-environmental behaviour intentions (proposed theoretical model, figure 1)

**Methodology**

Data were collected from overnight park visitors at eleven different parks across Alberta using on-site-self-administered surveys during the summers of 2018 and 2019 (June-September). Survey responses were collected during weekdays, weekend days, and holidays. Park visitors were approached at random at various locations throughout the parks, including trail heads, permit offices, visitor information centres, boat launch areas, and campsites. We randomized sampling by selecting the next available visitor as long as they were not visibly occupied by other pressing issues. This temporally stratified convenience-based sample strategy resulted in 1,672 completed surveys. Researchers used Android tablets, with the Qualtrics off line app and paper-based surveys, to collect all data on-site(s).

**Results**

The over-night park visitors were predominantly female (57%), had an average income of over $100,000 CAD, were highly educated, and more than 80% had completed some form of post-secondary education. High levels of income and well-educated park visitors are consistent with statistics found in Alberta (and across Canada). In addition, respondents were primarily under the age of 50. Ninety eight percent of participants camped with family and friends in groups of 5 individuals or less (68.8%). The majority were also returning visitors of the respective parks, with only 34% of park visitors camping for the first

time in to that particular park. Visitors' primary motivation was enjoying nature (90%) while learning about nature was the least important reason (62%). Not surprisingly, visitors scored high on the New Ecological Paradigm (M = 5.71) with visitors who attended personal interpretation programs slightly more in inline with ecocentric worldviews (M = 5.78). The current study used Mplus 8.4 (Muthen & Muthen, 2018) to analyze the data with maximum likelihood estimation. Early results include the phase 1 model of the current TPB variables which suggests good model fit ( $\chi 2$ = 360.299, df = 77, p = < 0.001, RMSEA = 0.04, CFI = 0.93 , TLI = 0.91, SRMR = 0.044). Phase 1 model accounted for 68% of the variation in park visitors' intentions to engage in PEB (R2 = .678). Data analysis for phase 2 (extended TPB proposed theoretical model) is ongoing.

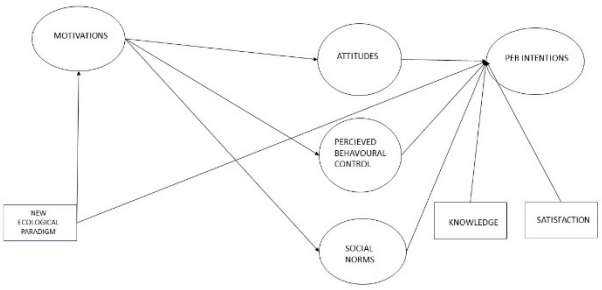


*Figure 1*

**Discussion**

One of the persistent requests of park managers is: what influences visitors to engage in pro-environmental behaviors? This research provides theoretical and practical insights regarding environmental interpretation. Validation and extension of the TPB contributes to the field by enhancing our understanding of the psychological factors that underpin behaviours and provides further insights on visitor satisfaction, learning, and motivations for park trips (and attending interpretive programming) may influence behaviours. Satisfaction is critical to achieving park goals of positive visitor experiences and discovery (Manning, 2011) as well as positively influencing pro-place behaviours such as return visitation and recommendations to others (Halpenny, 2006). While knowledge does not appear to directly translate into behaviour, studies have shown knowledge gain as a result of interpretation may promote nature protection and stewardship (Hughes et al. 2011; Tubb, 2003). Finally, understanding the motivations of diverse audiences is one way for managers to tailor key messages and is considered to be a promising strategy for fostering engagement and behaviour change (Falk, 2011).

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# Incusive and accessible outdoor recreation and nature-based tourism?

| SESSION | PART | DATE | TIME | CHAIRS |
|---|---|---|---|---|
| 5E | I | Wednesday 18th August | 15.40 – 17.00 CET | Sandra Wall-Reinius |
| 7E | II | Thursday 19th August | 12.00 – 13.20 CET | Kristin Godtman Kling |
| 8E | III | Thursday 19th August | 13.30 – 14.50 CET | Anna-Maria Pálsdóttir |

| | Programme |
|---|---|
| *5E* | **29** Accessible recreational areas? A pilot study on disabilities, experiences and the outdoors |
| | **135** "Inclusive Parks": A scoping review of accessibility standards for people with disabilities |
| | **152** Providing accessible recreation outdoors: User-driven research on standards (PARCOURS) – Research protocol |
| *7E* | **39** Balancing values of accessible nature-based tourism, nature conservation and the visitor experience |
| | **113** A just access to urban green commons? The case of people using wheelchairs in Stockholm |
| | **110** Wellbeing geovisualization: geographies of difference, accessibility and everyday natures. |
| | **17** How mobile apps can draw families to the forest |
| *8E* | **188** Nature-based vocational training for nature conservation and human wellbeing in Skåne, Sweden |
| | **89** Does nature support the integration of immigrant youth? A study on adolescents in the city of Lahti, Finland |
| | **130** From idea to practice: potentials and obstacles in engaging volunteers and refugees in nature based integration in five Danish municipalities. |
| | **84** Researching, attracting and catering for 'non-traditional' visitors in South African National Parks |

# 29 Accessible recreational areas? A pilot study on disabilities, experiences and the outdoors

**Rosemarie Ankre**, **Sandra Wall-Reinius**, Mid Sweden University/ETOUR, Sweden

**Introduction**

Nature experiences and outdoor recreation have numerous positive outcomes with important physical and mental health benefits for the individual. In various international and Swedish legislative proposals and governmental letters this is evident; public health and well-being must be supported, as well as outdoor recreation, and nature experiences for everyone. Some groups in society are nevertheless excluded. Different physical disabilities can be particularly challenging due to physical barriers in nature. It can also be a challenge to get to nature areas because of, for example, incomplete information, long distances, transportation, or individual ability. Lack of accessibility is still a crucial obstacle for people with disabilities to participate in outdoor recreation (Burns et al., 2009).

A better understanding of the participation patterns and perceived constraints by people with disabilities is necessary if nature and outdoor recreation are going to become accessible and inclusive (Corazon et al., 2019). The project aims to understand factors that enable and hinder participation in outdoor activities for people with physical disabilities. In the context of Östersund municipality, Sweden, we discuss how people with physical disabilities perceive accessibility to nature, and analyse available information on websites. What prevents people from getting out into nature? What kind of barriers can be identified? What kind of information is needed and is it available?

**Method**

This is a pilot study with a mixed-methods approach, using semi-structured interviews as its main data collection, followed by an analysis of websites and field observations. Initially, six interviews were conducted in October 2020-May 2021 with people with physical disabilities. The interviewees were identified through local disability associations and were contacted either by email or telephone. The interviews lasted approximately 1–1,5 hours, and were recorded, transcribed and anonymised. Questions included experiences and activities in the outdoors, their experiences of accessibility, safety and information. Follow-up questions were used, often leading to an unstructured dialogue where issues and anecdotes emerged.

Five websites were analysed: Östersund municipality, Jämtland county administration board, Jämtland Härjedalen Tourism (JHT), the Accessible database, and Naturkartan.se (a digital visit guide to nature areas). The focus was to identify information available in terms of outdoor recreation. In addition, 18 place observations were carried out in Östersund municipality in June-July 2019 and 2020. These areas - nature reserves and non-protected nature areas - were selected based on website information and the researchers' local knowledge. Factors such as terrain, public transportations, facilities and the outdoor opportunities in general were considered. An observation took 1-3 hours and included field notes and photo documentation.

**Results**

The interviewed spend a lot of time in the nearby nature; it is safer and takes less energy without disappointments. The need for assistance to get out into nature is in many cases clear; people with disabilities are not always independent or autonomous. Maja, a woman in her 40s and nearly blind, says: "One limitation is to get to nature areas by car or bus, it becomes a project too big; I rarely go alone, it is with my husband and children. I have the right to a travel service but it is difficult, it is expensive and not obvious to find the way to nature." Transport options are important, as well as to actually being able to get from the parking lot to the nature area. There is an obvious lack of understanding of the whole chain of accessibility; to get from A to B. Daniel uses a wheelchair due to an accident and he describes: "Often it is the last meters that becomes a problem. I never get all the way... we saw the water, but we had to sit in the car and eat. ... I feel that it is the final part that goes wrong." However, motorized outdoor activities (e.g. quad bike, moped or snowmobile) make nature

more accessible, according to some of the interviewed.

Mainly the interviewed get information about various nature areas for outdoor recreation from other people. Interviewees state that information is very important for daring to visit places, especially locations where you have not been before. It is crucial that detailed information is available on websites with images of the nature area as well. Information they considered of relevance was about the terrain, distances, accessible toilets, and public transports. The lack of adapted toilets is something that all interviewees highlight as a problem when they visit nature. Simple practical adjustments but also information would make nature more accessible. For the interviewees, on-site signs and information boards are appreciated - if the authentic feeling of the area remains.

Our overview of the websites shows that the degree of detailed information differs a lot, and that information is dispersed and not always easy to find. For example, the nature reserve Lillsjön is described to have an adapted footbridge, but the place observation showed that it had been closed for several years for an up-coming restoration. Also, the digital information regarding accessibility of adapted fireplaces and wind shields as well as facilities and equipment on site, need to be developed.

**Conclusions**

This study reveals how important local nature is to people with physical disabilities and that basic adjustments are lacking (e.g. toilets) and holistic understandings of the experience. There is information about some accessible nature areas in Östersund municipality, but there is still a lack of basic and detailed information. The place observations show that certain nature areas are accessible, but that there is a gap between the municipality's strategy and reality. Based on this study, the conclusion is that Östersund municipality tries to be inclusive but further information needs to be developed in dialogue with people with disabilities.

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# 135 "Inclusive Parks": A scoping review of accessibility standards for people with disabilities

**Labbé Delphine[1,2,3], Ernesto Morales[4,5], William Thériault[4,5], Brianna Tang[2,6], François Routhier[4,5], W.Ben Mortenson[2,7,6], Mike Prescott[2]**, [1]University of Illinois at Chicago, USA. [2]University of British Columbia, Canada. [3]Simon Fraser University, Canada. [4]Université Laval, Canada. [5]Center for Interdisciplinary Research in Rehabilitation and Social Integration, Canada. [6]Rehabilitation Research Lab, Canada. [7]ICORD, Canada

It is well recognized that access to green and blue spaces have physical, social, psychological and health benefits for people with and without disabilities (Gascon et al., 2017; Labbé et al., 2019; Markevych et al., 2017; Merrick et al., 2020; Rugel et al., 2019, Zhang et al, 2019.). However, many people with disabilities are still excluded from these spaces because of accessibility issues (Burns et al., 2009). The federal government has determined that accessibility for people with disabilities in Canada's world-renowned national parks should be addressed (Marcastel, 2019). Historically, standards have focused on promoting access for people with physical disabilities; however, existing accessibility standards are relatively dated and have had less emphasis on people who experience cognitive or sensory challenges (i.e., visual or auditory) (Parks Canada, 1994). For example, wayfinding is emerging as a critical topic for different disabilities to identify accessible routes for planning purposes and enable real-time navigation. Moreover, environmental features intended for one group (e.g., tactile sidewalk sections for people with vision problems) may make it challenging for people from another group (e.g., those who use mobility devices like wheelchairs) (Ormerod et al., 2015). It is thus important to avoid developing standards in a siloed manner (i.e., with only one disability group in mind).

This scoping review is part of the project Providing Accessible ReCreation Outdoors: User-driven Research on Standards (PARCOURS) which overarching goal is to improve the Canadian accessibility standards for national parks funded by the Canadian Accessibility Standards Development Organization. The first phase of this project was to conduct a scoping review to compare and contrast existing international and national standards and novel research evidence to inform the development of revised standards. The question guiding the search for relevant studies was "What are the current accessibility standards in terms of outdoor spaces, including parks to allow people with disabilities to enjoy the natural environments in their community?"

The scoping review involved five steps: identifying the research question, identifying relevant standards and guidelines, choosing standards, charting the data, and reporting the results (Tricco et al., 2018). The scoping review was conducted between June 2020 and February 2021 using Google search and governmental or official park websites. The search terms included accessibility terms (e.g., access* standard*, disabilit* policy, regulation*, guidelines), parks and nature terms (e.g., parks, outdoors, natural, urban, trail*, path*, national) and mobility device and disability types (e.g., wheelchair*, scooter*, blind, partial sight, deaf, hard of hearing, cognitive, mental, developmental). The searched covered International (e.g. United States, World, WHO, Europe, France, Switzerland, United Kingdom, England, Australia, Spain) and Canadian national standards, including provincial guidelines. For feasibility purpose, we excluded the guidelines and standards from cities. The search was conducted both in English and French, and standards in Spanish were also included as those 3 languages are spoken by the research team. The data was extracted and charted based on the features listed on the Parks Canada website and bonified with the content of the other standards founded. This list of features included: Paths and trails (e.g. sidewalks, walkways, stairs, ramps, lighting, obstacles), parking and drop-off areas and transit areas, amenities (e.g. rest areas, visitor centers, outdoor shelters, point-of-sales, washrooms), Wayfinding and signage, Park Management (e.g. policies, practices, and communications) and Summer and Winter activities (e.g. access to activities, equipment, installations). This last step of the scoping review is currently ongoing.

The search resulted in 30 standards and guidelines: 14 Canadian and 16 International. The preliminary results of the data extraction highlighted that the features that were the most covered were the accessibility of websites, parking access, paths and trails requirements. In terms of amenities, most documents included recommendations for information centers and washrooms. Summer activities were also covered by most standards including picnic tables, beach access and camping sites requirement. The standards more rarely included requirements on signage and wayfinding, and when they did, they mostly covered detectable warning surfaces for people with visual limitations. Moreover, despite the fact that many of those standards were developed in countries with winter conditions, requirements for winter activities were included in only one standard. Moreover, the level of specificity of the requirements varied greatly between the standards and guidelines, which could impact their implementation. For instance, some standards included only general statements about the necessity of having accessible parking space, while other standards offered specific ratio of parking space/accessible space.

The next phases of the PARCOURS project will be audits of national parks in two Canadian provinces and walk-along interviews with people with disabilities in those parks. Our team will then compare data from these audits with the existing standards identified in the scoping reviews. This review process will determine how compliant these park sites are with existing standards. The team will also assess if the standards are missing features based on the lived-experiences of people with disabilities of the outdoors and nature. The overall goal will be then to make recommendations for new standards to the Canadian government. This project will contribute to reducing barriers for people with disabilities and creating communities that enable everyone to participate fully and enjoy the nature splendors that Canada as to offer..

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# 152 Providing accessible recreation outdoors: User-driven research on standards (PAR-COURS) – Research protocol

**Michael Prescott[1], Julie Robillard[2], Marie Grandisson[3], Atiya Mahmood[4], Routhier François[1,5], Krista Lynn Best[1,6], Delphine Labbé[7], Mir Abolfazl Mostafavi[1], William C. Miller[2], Ernesto Morales[1], Bonita Sawatzky[2,8], Laura Bulk[2], María José Aguilar-Carrasco[9], Jaimie Borisoff[10], W. Ben Mortenson[2,8]**, [1]Université Laval, Canada. [2]University of British Columbia, Canada. [3]Université Laval, USA. [4]Simon Fraser University, Canada. [5]Centre interdiciplinaire de recherche en rcadaptation et intégrational sociale, Canada. [6]Centre interdiciplinaire de recherche en réadaptation de la Capitale-Nationale, Canada. [7]University of Illinois at Chicago, USA. [8](International Collaboration on Repair Discoveries, Canada. [9]Universitat Politècnica de València, Spain. [10]British Columbia Institute of Technology, Canada

**Background**

Although people with disabilities desire outdoor park experiences similar to other visitors, getting around parks and enjoying their features can be a challenge. There are environmental obstacles and hazards that affect the accessibility and enjoyment of parks (i.e., wayfaring) as well as difficulties maintaining orientation and direction (i.e., wayfinding) that can result in anxiety. These conditions can diminish the many benefits attributable to park participation. In Canada, federal parks have a duty to accommodate, as best they can, the diverse needs and preferences of people with disabilities who make up 22.3% of the population. In response to this imperative, Canada is in the process of developing accessibility standards to ensure universal access. The overarching purpose of this study, funded by Accessible Standards Canada (ASC), is to inform these standards through the lived experiences of people with disabilities. The objectives are to identify and prioritize the impact environmental factors have on the ability of individuals to gain access to and enjoyment of all aspects of the park experience, document the range of these requirements, and develop and prioritize standards that can be used by parks to promote accessibility in parks. The following describes the proposed protocol for the study.

**Methods**

This mixed-methods, three-phase study will be conducted over a 2-year timeframe. Phase 1 will be a systematic review of existing standards used internationally and an environmental audit of accessibility conditions in six parks located in two Canadian provinces to be used in the phase 2 mobile interviews. Parks have to be in diverse settings (mountains, forests, shorelines) and offer a variety of experiences that are similar to those found in federal parks (hiking, skiing, swimming). Two of the six parks are in moderate rain forest regions that do not experience as much freezing temperatures or snow. The study has received ethics approvals from local ethics boards.

Phase 2 will include 24 people with a variety of disabilities and assistive device supports, over the age of 18, can communicate in English or French, and can walk or wheel approximately 2 km. A convenience sample of participants will be recruited from databases of previous participants and postings on research sites. Our goal is to recruit 3 people who use manual wheelchairs, 3 people who use power wheelchairs, 3 people who use scooters, 3 people who use walkers, 3 people who use canes or crutches, 2 people who are D/deaf or hard of hearing, 3 people who are blind or partially sighted, and 4 people who have a variety of cognitive, developmental, or mental disabilities such as autism or dementia. All participants (N=24) will complete one mobile interview in the summer and half (N=12) will repeat this exercise in the winter in the same park. The interview will take place along a series of three connected trails (approximately 600 – 1400m in length). The trails were chosen to maximize the trail experience as well as many features (e.g., benches, beaches, lookouts, signs) as possible. In phase 3, findings from the review and interviews will inform the creation of potential standards that will be recommended to the ASC based on the findings of a series of Delphi panels.

**Data Collection**

In phase 2, participants will be assigned to one of three parks in their province that will maximize the diversity of participant mobility requirements. At the site, Covid-19 safety procedures will be reviewed as well as the purpose of the study and their rights to discontinue the study at any time without compromising their stipend. Participants will be taken to the starting point of the first route where they will be given a map of the route with the destination displayed. During travel, they will be asked to provide insights using semi-structured questions about their subjective experiences and structured questions about feature accessibility. The mobile interview will be recorded by a researcher using an audio recorder and GoPro video camera with GPS. Participants will also wear eye-tracking glasses to determine what objects they focus as they travel.

At the end of each route, participants will be asked to verbally recall the route with as much detail as possible and draw this (sketch map) on 1) a blank piece of paper and 2) a satellite map of the route. For those that are not able to draw, the researcher will use their verbal description to create a sketch map. The maps will be annotated it with comments and recommendations for improvements described by the participant. Participants will also be asked to rate the difficulty of the route and complete spatial skills tests that asks them to point to the start of that route using a compass and estimate the distance and slope to a pre-defined landmark.

The findings from the wheeling/walking interviews will be transcribed and coded using a framework that addresses the wayfaring and wayfinding challenges faced by people with disabilities. These codes and direct quotations will be imported into a GIS along with the GPS tracks and digitized sketch maps. Together, these will constitute a spatial transcript that will be used during phase 3 where a consensus will be developed using several national Delphi panels that focus on specific areas (e.g., trails and paths, information, services) to identify and prioritize standards that should be implemented.

**Discussion**

We plan to identify a range of park experiences, preferences, and requirements that will inform the accessibility standards of outdoor parks, emphasizing the diversity in accessibility needs due to personal factors. Secondary findings may also highlight other interventions that could be used to improve park experiences such as programs and services that address personal fitness, information provision that can be used for planning trips and during travel, adaptations to mobility device adaptations, wayfinding training, improvements to surfaces and signage, and inclusive planning strategies that incorporate the diverse needs of people with disabilities.

## 39 Balancing values of accessible nature-based tourism, nature conservation and the visitor experience

**Kristin Godtman Kling**, Mid Sweden University, Sweden

Spending time in nature and participating in outdoor activities has positive effects on the health and well-being of individuals, and nature-based tourism and outdoor recreation have the potential to provide an appropriate setting to engage in such activities (Farkić et al., 2020; Lackey et al., 2019). Even though our understanding of the benefits of nature experiences is well established, there remains unequal access to nature and nature-based activities among different groups in society. People with disabilities are often excluded from being able to fully participate in nature-based tourism and recreation due to physical and social barriers. There is therefore a need for natural areas to become more inclusive and cater to the needs of diverse groups of visitors (Menzies et al., 2020).

The accommodation and adjustment of natural areas so that they become more inclusive for people with disabilities nevertheless entails some contradiction of values, especially between accessible nature-based tourism, nature conservation and the visitor experience (Corazon et al., 2019; Donlon, 2000). Increased accessibility in, as well as to, natural areas often means expanding infrastructure and improving facilities; actions which can have an impact on visitors' perceptions of 'untouched' nature and raise questions as to whether they are compatible with the objectives of nature conservation (Tverijonaite et al., 2018). However, political objectives of 'accessible nature for all' are highly important in the context of social sustainability and social inclusion, and managers and planners of natural areas therefore have to balance these differing values in order to ensure that different interests and expectations are met. This balancing creates a moral dilemma concerning access to nature: who has access and who is excluded, and how should values be prioritised?

This qualitative study interviewed tourism entrepreneurs, disability rights activists, and managers and planners of natural areas in order to examine how different actors view and handle this perceived clash of values. Results show that this issue primarily concerns those working with nature conservation, as they have to make decisions about the level of accessibility in natural areas. Respondents from this category viewed accessibility from a practical standpoint, and argued that the main barrier to developing accessibility in natural areas is strained financial resources, given that such efforts are costly to initiate and to maintain. Therefore, given the constraints on their budget, managers and planners need to select carefully which areas are most suitable for the necessary adjustments needed for increased access for people with disabilities. For those working with nature conservation, their objective of conserving the natural environment appeared to take precedence over increased accessibility. Results from the interviews with this category of respondents suggested that it is not desirable to accommodate the preferences of accessibility of all groups in all natural areas, as too much infrastructure to enable people with disabilities access is argued to ruin the experience of 'untouched' nature and may harm sensitive flora and fauna. Although they recognise the issue as complex, they see it as inevitable that people with disabilities will not have the opportunity to experience all types of nature environments due to lack of accessible infrastructure. However, respondents acknowledge that all human presence in nature is a form of intrusion, be that a narrow path or a wheelchair ramp. This makes the issue of accessibility in nature more complex, and raises the question of whether current levels of accessibility are already "too much". The idea that 'untouched' nature equals high quality nature experiences makes being in nature an exclusive activity, only possible for the able-bodied. This raises the question of why intrusion in nature is only reserved for a certain strata of society. One disability rights activist argued rhetorically that if some nature environments are so sensitive that they risk becoming damaged by visitors, perhaps they should be closed off entirely. This suggests that there are incentives to re-think measures of accessibility as ruining the nature experience, so that more people will be able to take part in the benefits of outdoor activities.

This study raises concerns regarding sustainability, equality, and justice, which are issues that need to be given greater attention if nature-based tourism and outdoor recreation are to become fully inclusive. Collaboration between different stakeholders is needed in order to offer up more insights into how to handle the differing values of nature-based recreation. Moreover, there is a need to include people with disabilities in the planning process of accessible natural areas from start to end. This research suggests that in order for natural areas to become accessible for all, there is a need for increased knowledge about the connection between accessible nature experiences and social inclusion. The study also argues for enhanced collaboration between planners and managers of natural areas, the nature-based tourism and outdoor industry, the academia and disability rights activists to challenge the assumption that accessibility, nature conservation and the visitor experience are incompatible interests.

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# 113 A just access to urban green commons? The case of people using wheelchairs in Stockholm

**Annika Dahlberg**[1], **Sara Borgström**[2], [1]Stockholm University, Department of Physical Geography, Sweden. [2]Royal Institute of Technology, KTH, Department of Sustainable Development, Environmental Science and Engineering, Sweden

**Introduction**

Urban green space and urban green infrastructure as contributors to city qualities have received growing scholarly and practical attention. Of the many forms of urban green space, we focus on urban green commons (UGC), arguing that issues of environmental justice are highlighted and strengthened in the perspective of commons. The UGC concept has been used with slightly different meanings, where e.g. Németh (2012) defines urban commons (not only green spaces) as being collectively owned, held in joint use, and to which everyone has access. Colding's and Barthel's (2013:157) definition of UGC includes urban green space of varied ownership and which "depend on collective organization and management", as e.g. community gardens and allotment gardens, which are not open to all. In this study, we define UGC as green spaces that legally are accessible to anyone, which in a Swedish context is where the Right of Public Access applies (SEPA 2020). However, just because you have the legal right of access does not mean that you have realized access.

We focus on access in a broad sense explored from an environmental justice perspective. The degree of access is often defined quantitatively such as proximity to green spaces, or by how many from a certain social group use these spaces (Kabisch & Haase 2014). However, access is a complex concept, and inspired by Rigolon (2016) we include mental (e.g. fear), social (e.g. company), physical (e.g. roots, ice), and structural (e.g. transport, information) aspects of access. There are different ways of theorizing and analyzing environmental justice (e.g. Anguelovski 2020), and in this study, we follow Svarstad and Benjaminsen (2020), who defines environmental justice as distributive, recognition, procedural, and capabilities, and Rutt and Gulsrud (2016) who apply this lens on access to UGC. We find that within these 'categories' all aspects of environmental justice can be explored.

UGC are intended to be accessible for all people – but is that really the case? Loftus (2020) raises the question about what really is included in the expression "all the people" that often is used in policy and planning declarations, also concerning urban green spaces. But are they in practice UGC from an environmental justice perspective? The use of UGC is increasingly studied, but people with impaired mobility, e.g. using a wheelchair, is one example of a group whose access to urban green spaces has been largely neglected. Most studies about this group include all disabilities (Burns 2013) or are not focused solely on the urban context (Burns 2013, Stigsdotter 2018). However, Corazon et al. (2019) present a qualitative study with people with mobility impairment in cities.

**Aim and methods**

Based on a case study in the Stockholm region, Sweden, the aim of this study was to increase the qualitative understanding of accessibility to UGC through the experiences of people dependent on a wheelchair. Our goal was to allow the voices of the respondents to steer our analysis. The main method applied was in-depth interviews with 17 people who use a wheelchair on an everyday basis and/or represent organizations working for their increased accessibility to UGC. This was complemented with an online survey to which 58 wheelchair users responded. The main themes investigated included the perceived value of nature interactions and access to UGC understood in a broad sense, including both opportunities and barriers.

**Results**

Not surprisingly, we found that people are similar in the sense that nature values appreciated are similar independent of mobility. However, for people with severe mobility impairment, it is crucial that these values are accessible nearby, which allows viewing from home, short trips, less preparation, less stress,

no need for transport, and less need for assistance. With the increasing densification of cities, these neighbourhood UGC are decreasing, which will therefore negatively influence people using wheelchair as compared to others. Our results also clarify many important aspects of barriers beyond proximity and more seldom studied. We identified a temporal sequence of barriers, from thinking and planning a visit at home, getting to the UGC, managing there, getting home, and reflecting afterward. At different stages, our respondents encountered mental, social, physical, and structural barriers, which could discourage from, or even prevent future outings. If these barriers were reduced, e.g. better equipment provided, information and transport improved, and unnecessary physical barriers removed, much would change for this group. It was clear that in any accessibility endeavor their range of capabilities was as broad as in overall society, and that this variation must become much better considered. Respondents highlighted the challenging trade-offs in all people having equal access to all UGC, where they argued for a balance between improving accessibility to "untouched" nature and maintaining the values of the same areas.

**Discussion**

All people value access to multiple nature qualities in their everyday life (see Stigsdotter 2018, Corazon 2019), but often more so by people in wheelchairs due to their limited mobility. Thus, it is important to preserve both nearby and more remote UGC providing a variety of such qualities. However, earlier studies (e.g. Stigsdotter) show that people with mobility impairments less often venture out to UGC, as also shown in our study. Therefore, barriers to access UGC must be removed as much as possible, especially since nearby UGC still are decreasing. Efforts to this effect are made, but often as relatively short-term projects and single improvements without a holistic, just, and inclusive recognition of different needs. The examples illustrated in this study clearly show the urgency of including the four aspects of environmental justice (Rutt and Gulsrud 2016, Svarstad and Benjaminsen 2020) in UGC policy, planning, and management, i.e. distribution, recognition, procedure, and capabilities.

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# 110 Wellbeing geovisualization: geographies of difference, accessibility and everyday natures.

**Isabelle D Wolf**, **Gordon Waitt**, **Australian Centre for Culture**, Environment, Society and Space, School of Geography and Sustainable Communities, University of Wollongong, Wollongong, NSW 2522, Australia, Australia

## Introduction

Some of the benefits for people whose everyday routines are organized to incorporate interactions with places for nature are well established in the liveable cities literature. Officially designated greenspaces, including parks and reserves, for instance not only play an important role in maintaining biodiversity and socio-ecological functions; they offer urban recreationists the opportunity to exercise, socialize and relax (Torland, Weiler, Moyle & Wolf, 2015; Wolf, Stricker, & Hagenloh, 2015). And yet the multitude of benefits of urban places of nature remains largely understudied (Wolf, Ainsworth & Crowley, 2017). Also places that may be socially constituted as 'natural' beyond official categories of greenspace are often not included when researching the benefits of engagement with places for nature. This project enrolls a participatory geographic information system (PGIS) and specifically visualization to better understand the relationships between everyday natures and wellbeing.

## Aims

Here, we ask four central questions in our geovisualization of wellbeing and everyday natures in Sydney, Australia: (1) Where and how do people engage with everyday natures in Sydney?; (2) What is the relationship between everyday nature spaces and wellbeing?; and (3) Which factors facilitate or constrain the attainment of wellbeing benefits?; (4) How useful is geovisualization of recreational activity patterns and wellbeing?

## Methods

Theoretically, this paper is positioned within work in geography (Fleuret & Atkinson, 2007) and leisure sciences (Driver, 2008; Weiler, Moyle, Wolf, de Bie & Torland, 2017), that is thinking relationally about both the concepts of wellbeing and nature. Methodologically, the project design combined a panel survey with 800 ethnically diverse Sydney residents administering a survey questionnaire with an integrated mapping component. In the later, participants were invited to map everyday nature places that work towards and against wellbeing.

## Selected findings

The preliminary findings show that:

**(1)** Participants mapped more than 2000 markers of places for nature important to them either in their neighbourhood or in Greater Sydney. Conversely, they also mapped about 600 places that detracted from their wellbeing.

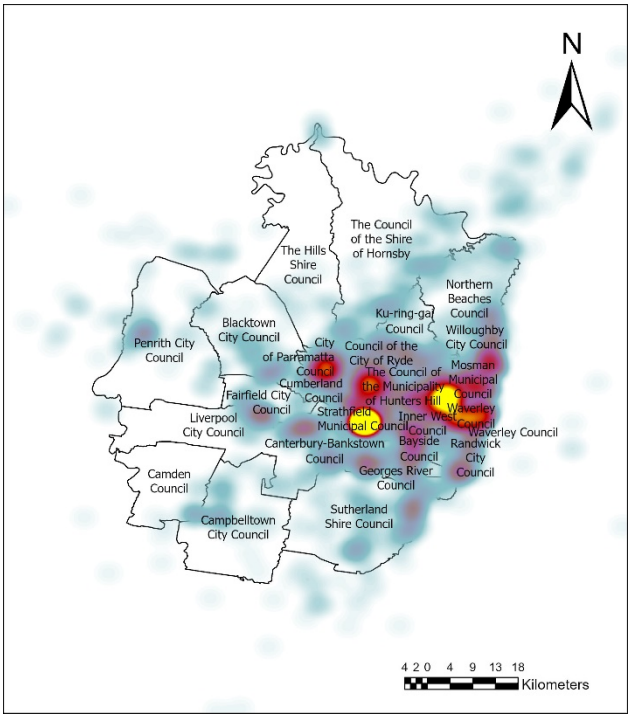


*Figure 1 Greater Sydney wellbeing places for nature with yellow indicating the greatest density of places mapped by survey participants*

Sydney residents mapped engagement with nature in more than 40 different activities in places both within and beyond those officially categorized as parks or reserves. At the Greater Sydney scale, engagement occurred in larger often 'iconic' parks, national parks and beaches. At the neighbourhood

scale engagement occurred in local parks, miniature reserves, beaches; but also in a cemetery, the streetscape and near greenspaces of residential buildings as well as along waterways and the harbour.

**(2)** Twenty-seven wellbeing benefits were identified from engaging with nature. Confirming previous research, the majority of participants emphasized the therapeutic benefits (e.g., achieving mental health benefits, physical health, escaping the city/everyday life), but also those pertaining to sociality (e.g., feeling part of the community, socializing with friends and family), a sense of security (feeling safe, feeling calm) and being enabled to lead a flourishing life (e.g., feeling positive about yourself, contributing to the happiness of others, feeling a sense of accomplishment).

**(3)** Specific conditions of places of nature needed to be fulfilled and facilities provided to help recreationists experience benefits. For example, places that generally worked towards wellbeing provided fresh air, quietness/piece/solitude, scenic beauty, tree cover/shade, open space with short, mowed grass, a contrast to the city; and facilities such as bathrooms, seating/rest areas, trash bins, drinking water fountains, play areas for kids and mobile phone coverage.

Conversely, 11 of 19 different factors were considered constraining by at least half of the participants. Places that worked against wellbeing cost too much too travel to, were hard to reach because of too much traffic or being too far away from home, were too crowded, noisy and lacked shade. To a lesser extent, not feeling safe, or unwelcome, fear of theft and of conflicts, being without a companion, having no time, and not knowing where to go constrained engagement with places for nature.

Also, engagement with nature places, perception of benefits and constraints depended on various socio-demographics factors including the ethnocultural background, life stage and gender, as well as the spatial location in Sydney.

**(4)** Enrolling a participatory geographic information system to map wellbeing as a spatial layer with multiple dimensions enabled the visualization of wellbeing through maps for efficient communication. It also has the advantage that wellbeing (or a lack thereof) can be linked to specific physical spaces. Therefore, the concept of engagement with everyday natures becomes tangible, and constraining and facilitating factors can be managed in each locale individually.

**Implications and conclusions**

Here we showcased how a participatory geographic information system coupled with a survey allows to map wellbeing and better understand the conditions conducive for wellbeing. Accounting for the multiple dimensions of wellbeing spaces will allow to better focus on the range of wellbeing benefits to re-imagine more diverse places for urban nature and address the process of exclusion along socio-economic lines.

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# 17 How mobile apps can draw families to the forest

**Berglind Karlsdóttir**, **Liz O'Brien**, Forest Research, United Kingdom

**Introduction**

Forestry England has a history of producing children's activity trails at their forest sites based on popular media characters such as Zog and Stickman. The aim of these trails is to engage children and families with the forest through forest-based activities with stories which are meaningful to children. For a recent trail based on Shaun the Sheep (an animated film by Aardman Animations), Forestry England partnered with Sport England to also encourage increased physical activity.

Some of the trails have been app-based, using technology to provide visitors with challenges and fun interactive and augmented reality elements. Activity packs are sold on site with stickers and activity booklets linked with the apps which are free. Signposts or statues of characters provide clues along the trails. Previous surveys have shown that the trails, especially the Gruffalo Spotters in 2017, have brought a high number of visitors to the forest.

Encouraging increased visits to forest sites and other natural environments brings multiple, physical, psychological and social benefits to visitors (O'Brien et al., 2011; Houlden et al., 2018; Twohig-Bennett and Jones, 2018). Further benefits can be gained from undertaking physical activity in forest settings (O'Brien, 2019).

The Forestry England trails are targeted at younger age-groups, usually ranging somewhere between 3-12 years. With mental disorders among children and young people on the rise (NHS, 2018), coupled with concerns about children's lack of engagement with nature, it is important to design interventions for children that provide opportunities for nature-based social interactions, physical activities and cognitive restoration.

The Forestry England trails provide such opportunities through designing attractive mobile apps based on much loved children's characters. Time used by children on electronic media is negatively correlated with time spent in nature and connectedness to nature, and can lead to physical and psychological health problems (Larson et al., 2019). However, the two are not mutually exclusive and Human-Computer Interactions (HCI) technology can improve both time spent in nature and connectedness to nature. Exploratory technology such as the Forestry England apps help "encourage children to explore outdoors in nature" (Anggarendra and Brereton, 2016)

**Methods**

We conducted an evaluation of the Shaun the Sheep app-based trail to understand the health and wellbeing benefits to visitors as well as the benefits to Forestry England. Data will also be gathered on the Gruffalo Spotters 2021 trail and early results will provide additional insights.

Questionnaires for the Shaun the Sheep trail were administered face-to-face with trail users at four forest sites in 2019 and 184 were completed. The questionnaires contained a mix of closed and open questions based on data collected for Forestry England's Active Forests Programme. Qualitative feedback was sought from adults and children through informal discussions. Furthermore, children chose three words that best described their experiences of the Shaun the Sheep trail. Visitor numbers were calculated using pack sales, group sizes and site visitor data.

**Results**

The Shaun the Sheep trail was very well received by users. Awareness of the trail was mainly spread by social media and word of mouth. Specifically, some visitors had seen photographs of friends and families' children with interactive characters taken using the app on social media. Of the trail users, 21% were first time visitors. Evidence from a past trail evaluation shows that the proportion of first-time visitors to the forest sites was higher among trail users than general visitors. The main motivation to participate was "Keeping the children interested and engaged" (Fig. 1), and feedback on the app was overwhelmingly positive. Physical activity also came out as both a prominent motivator and benefit from the trail. The trails were all over 2 km in length ensuring a certain level of exercise, and 70% of groups said the trail

made the children breathe faster. Connection with the forest surroundings and social benefits were more diffuse; these scored lower in the questionnaires but tended to be indirectly mentioned in discussions. Finally, around 80% of respondents reported that they were more likely to undertake future activities in the forest or as a group.

*Figure 1. Motivations for doing the Shaun the Sheep trail*


## Discussion

The results indicate that the addition of the app and activity packs was effective in drawing families to the forest, enhancing their experience, and increasing physical activity. It appears that in a digital age where people of all ages and demographics have a smartphone, these devices can be used to encourage a wider audience to visit forests. It is noteworthy that the same devices that often drive inactivity and directly compete with time spent in nature can be used to promote the opposite. Examples of other such apps include Pokemon Go and Geocaching (Anggarendra and Brereton, 2016; Larson et al., 2019). Yet, the use of "sustainable HCIs" in connecting children to nature has been overlooked and understudied (Anggarendra and Brereton, 2016)**.** Further research is needed to understand the contributions of HCIs towards long-term benefits of activity trails and whether they help shape meaningful social and natural experiences.

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# 188 Nature-based vocational training for nature conservation and human wellbeing in Skåne, Sweden

**AnnaMaría Pálsdóttir[1]**, **Liz O'Brien[2]**, **Ann Dolling[3]**, [1]Dept. People and Society, Swedish University of Agricultural Sciences, P.O. Box 88, SE-230 53 Alnarp, Sweden. [2]Forest Research, Social and Economic Research Group, Farnham, Surrey,, United Kingdom. [3]The Department Forest Ecology and Management, Swedish University of Agricultural Sciences, Umeå,, Sweden

There has been an increase in the flow of refugees, migrants, immigrants, and asylum seekers into Europe from the Middle East and Africa, which has meant that their integration into societies has become an important topic. The Nordic countries have received a higher number of migrants per capita basis over the past few years than other European countries (Pitkänen et al.2017; Gentin et al., 2019). In 2015, about 163,000 people sought asylum in Sweden and the integration of these people into Swedish society has become an important focus for the government (Swedish Institute 2015-2018).

Nature-based solutions have been defined by the European Commission as 'solutions that are inspired and supported by nature' (European Commission, 2015 p5), and nature-based interventions can be used as solutions for a variety of purposes and with different groups within society. Pitkänen et al. (2017) found there is increasing interest in nature-based solutions which are seen as having the potential to be a cost-effective and efficient means of integrating migrants into host societies. A number of nature-based integration projects have been created in Nordic countries; they are mainly voluntary for migrants but can combine integration or labour market training or vocational and medical rehabilitation. One of the ways in which new people from other countries can become integrated into Swedish society is through employment and one innovative approach to enabling this is the 'Vocational training and integration through nature conservation' programme. This is a collaboration between the Swedish Public Employment Service, Swedish Forestry Agency and the Swedish Nature Conservation Unit is using a nature based integration programme to bring together migrants as well as long term Swedish unemployed to participate in a year (for migrants) and two-year-long (for Swedish unemployed) vocational training programme (Pálsdóttir, O´Brien and Dolling, 2020). The nature-conservation work covers 350 nature conservation sites in Skåne and 3 national parks. The sites cover a varied landscape from the coast in the south of Skåne to hilly forest sites in the north of the County. The programme provides training in nature conservation skills for all the participants and lessons in the Swedish language for the migrants. An evaluation of the programme is exploring whether it has brought about changes in general health, physical activity, self-efficacy and nature connectedness. A mixed methodological approach is being used through the use of questionnaires and in-depth interviews to explore the impacts of the programme on wellbeing. All questionnaires are self-administered on perceived health, physical activities, sleepiness and sleep qualities, nature connectedness, and self-efficacy The study ran from 2018 to 2019, including both Swedish and migrants. The data was collected as 3 survey waves; at the start of the program (baseline) then again after 12 months and 16 months. The trainees received both oral and written information about the study before deciding on participation. The information and questionnaires were provided in Swedish, Arabic, Tigrinya, Urdu, Farsi, Dari, and Somalian and a certified interpreter in respective language was present on all occasions. Altogether 214 individuals participated in the study thereof 88 Swedish trainees (11 females) and 126 migrants (3 females). The results show that to date there has been no change in physical activity levels or connectedness to nature over the 3 survey waves for migrants or Swedes. There has been a small but statistically significant change in perceived health for both Swedes and migrants between the baseline and follow-up at the end of the program. There was one significant result, which was overall sleep. This significant difference is driven by improved overall sleep across the three waves. Nature connectedness showed a significant positive correlation with both the health scores and the total general self-efficacy scores. The qualitative results highlight that the

trainees feel the conservation activities are physically demanding and are perceived as meaningful work. Many of the trainees talked about inviting friends and family to the sites where they worked and proudly showing them what they have been doing. This has meant the migrant families have been introduced to nature sites they would not have visited otherwise. Many migrants talked about starting to feel more rooted in Swedish society.

The trainees are in excellent health both mentally and physically at the start and therefore hard to expect improvement at significant levels. The vocational training program provides a good opportunity to learn new skills such as practical work in nature conservation and language as well as cultural exchange. For both groups, the program can help to prepare the trainees for entering the labor market and provide them with transferable skills that they can use for future employment or further training in similar work. As for the migrants, not only did they gain new skills but also this supported a connection to the new country through working with nature but also gradually included the families by bringing them out of the urban setting into nature conservation sites. This value-added outcome could be developed further by networking with the migrants' communities for introducing nature sites to a population otherwise not familiar with outdoor reaction in nature.

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# 89 Does nature support the integration of immigrant youth? A study on adolescents in the city of Lahti, Finland

**Riikka Puhakka**[1], **Kati Pitkänen**[2], **Iikka Oinonen**[2], [1]University of Helsinki, Finland. [2]Finnish Environment Institute, Finland

## Introduction

Successful integration of immigrants has been identified as the key for future social and economic well-being in EU. In Finland, a great share of the recent immigrants consists of people who have come to Finland as asylum seekers from countries whose cultural and natural environment is different from the Nordic countries. Nature has traditionally played a central role in the Finnish identity, although there are signs of polarisation in relation to nature among younger generations (Hakokõngäs & Puhakka 2021). Meanwhile, it is increasingly recognised that contact with nature promotes psychological, physiological, and social well-being and health (Keniger et al. 2013). Contact with nature can play an important role for social cohesion and immigrant integration (Jay & Schraml 2009). Green spaces seem to be especially important for immigrant youth to make contacts and friends across cultures (Seeland et al. 2009). Hence, nature can be an important means for integration, but it should also be understood as a resource that should be equally accessible to all (Gentin et al. 2019). Gentin et al. (2019) have suggested that the relationship between nature and integration can be understood in terms of structural and cultural integration that emphasises the importance of equal access to natural environments and knowledge related to nature. Nature is also important for interactive and identificational integration by offering a platform and means for social interactions and a meaningful target to form emotional bonds with other people and places.

This study applies the framework of integration (Esser 1999; Gentin et al. 2019) to study how nature supports the integration as well as the well-being of immigrant youth in Finland. We explore adolescents' participation in outdoor recreation and their well-being experiences of and relationships with nature in the city of Lahti. We analyse the differences between the immigrant and non-immigrant groups to discuss how nature can support the health and well-being as well as interactive and identificational integration of immigrants, and how structurally and culturally inclusive nature is to the youth.

## Method

The study is based on the survey data (N=1121) collected from students in 7–9$^{th}$ grades in autumn 2020. The survey questions were related to outdoor recreation, relationship with nature, and the perceived well-being effects of nature. The survey was delivered through SurveyMonkey Inc (www.surveymonkey.com) online survey tool to five schools in Lahti. Altogether 84 respondents were first- or second-generation immigrants whose both parents were born outside Finland. The data was analysed with statistical methods.

## Results

Immigrant adolescents spend less often time in natural environments than non-immigrant adolescents do – both in summertime (p=0.008) and wintertime (p=0.011). Especially immigrants that are from culturally different countries to Finland (countries in Middle East, Africa, and Asia) spend less often time in nature than others do (Figure 1). The main reasons for not spending more often time in nature are similar among immigrants and non-immigrants: they use leisure time for other hobbies, schoolwork, or playing with digital devices.

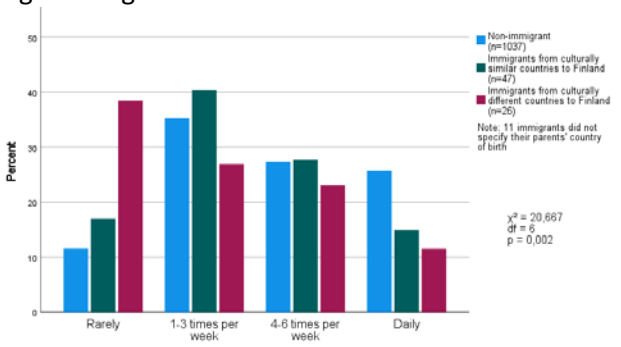


*Figure 1. The frequencies of spending time in nature (e.g., in forests, urban parks, shores, water areas) in summertime.*

Immigrant adolescents spend most often time in their own or shared yard, and green areas and parks near home. The most popular nature-based activities among them are mountain biking, hiking, and boating/canoeing/SUP boarding; 22–31% of immigrant adolescents participate in these activities weekly in summertime. Compared to non-immigrants, however, there is a greater share of immigrants (a third of them) who never go hiking ($p=0.012$) or boating/canoeing/SUP boarding ($p=0.002$). Furthermore, immigrant girls are less likely to get out into nature alone than non-immigrant girls ($p=0.026$).

In nature, immigrant adolescents experience positive feelings (e.g., calmness, safety; medians from 3.5 to 4 on a scale of 1–5) more often than negative feelings (e.g., nervousness, depression, loneliness; medians 2). However, immigrants feel themselves more often depressed in nature than non-immigrants ($p=0.007$). Both immigrant and non-immigrant adolescents responded that when spending time in nature, they feel restored and relaxed, their concentration increases, and they feel calm (medians 4 on a scale of 1–5).

**Discussion**

Our first results indicate that there are differences between immigrant and non-immigrant adolescents in how nature is part of their everyday lives and how they perceive well-being benefits. Immigrant adolescents spend less often time in natural environments and participate less often in some outdoor activities. In particular, a great share of immigrants from culturally different countries to Finland spends rarely time in nature, which raises concerns over structural and cultural inclusiveness of nature.

Immigrant adolescents' willingness to spend time in nature with friends or family rather than alone gives support for the use of nature as a platform for social interactions. Hence, natural environments have the potential of supporting the interactive integration of immigrant youth. Similarly, positive feelings experienced in nature are an important contributor to the emergence of positive place affiliations and indicate potential support for identificational integration. However, the greater variation of feelings experienced in nature by immigrants than non-immigrants suggests that some immigrant adolescents may also perceive natural environments as alienating.

Despite the differences, the results show that nature is an important part of immigrant adolescents' everyday lives in Finland and can support the social integration of immigrants. The study results can be used in developing new nature-based solutions for the successful integration of immigrants.

However, ethnic background is not necessarily the most important decisive factor, but other things such as gender and income could be important in explaining the differences in how the Finnish youth interact with and perceive nature. Therefore, further studies are needed on the adolescents' participation in outdoor recreation and perceived well-being effects.

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# 130 From idea to practice: potentials and obstacles in engaging volunteers and refugees in nature based integration in five Danish municipalities.

**Sandra Gentin**, **Søren Præstholm**, Department of Geosciences and Natural Resource Management, University of Copenhagen, Denmark

The European Commission has promoted revisiting and developing approaches for the successful integration of migrants all over Europe. One possible response to address this challenge is using nature as an arena for social integration of newcomers, as discussed by Gentin et al (2019). The aim of the project – "Nature friend – integration through outdoor recreation and nature activities" was to enroll new volunteers and test new approaches in integration of refugees and newly arrived asylum seekers through nature based activities. Local groups of the Danish Refugee council in five different municipalities in Denmark participated in the project.

The theoretical point of departure was Essers (1999) four basic forms of social integration: structural, cultural, interactive and identificational integration. Based on Esser (1999) the relationship between nature and integration can be understood in terms of: 1) Structural integration describing access to common resources and main institutions of society, 2) cultural integration with aquisition of knowledge and competences, cultural aspects, common practices, general rules of behaviour, 3) interactive integration describing friendships and social interactions, 4) identificational integration with emotional bonds to other groups and places. In this relation, "Naturefriend – integration through outdoor recreation and nature activities" focused on social interactions and language learning (interactive integration), as well as getting to know near-by nature (identificational integration). Further, the work by Rishbeth and Finney (2006) and their focus on novelty and nostalgia was found in the refugees' thoughts about the nature-based activities inspired the theoretical understanding of the refugee perspective of this project.

All activities within the project took place in easy accessible nature, and required no previous knowledge about nature, nor the activity. Volunteers introduced activities such as fishing, tadpole fishing, catching of crabs, socializing around the bonfire, beach wellness only for girls etc. in which the refugees and newly arrived asylum seekers could enroll. Focus was on introducing the refugees and newly arrived refugees to nature, outdoor recreation and show where and what can be done outdoors during spring, summer and autumn. The aim was to empower the participants to do similar activities on their own or with family and friends after participating in the project, which is in line with Pitkänen et al (2017) and Gentin et al (2018).

The volunteers evaluated each trip quantitatively through a small questionnaire, further, selected trips were observed, as well as selected participants (both volunteers and refugees) were interviewed after participating in the trip.

Although the refugees and newly arrived asylum seekers had no prior knowledge about the Danish nature, nature did not play a negative role in the activities. Nature made a positive difference for the participants as they often mentioned the activities as something they valued the most. Some of the activities reminded them of their former home country (nostalgia), while other activities were completely new to them (novelty). Participants also mentioned their sudden understanding of Danes' relationship to nature (e.g. anemones Anemone nemorosa, the smell of rape *Brassica napus*, or the leafing of the beech Fagus sylvatica), and other signs of spring, which taps into cultural integration (Esser 1999). Further, nature gave the participants an immediate feeling of stress-relief, which also was mentioned as a positive outcome of the trips.

The results of the questionnaire also shows that the refugees after participating have a better understanding of opportunities for outdoor recreation in the near-by nature, as well as the activities have brought volunteers and refugees closer together. The volunteers also mention that good leadership of the trips, their own knowledge about outdoor recreation opportunities in the near-by nature, as well as the provided activities had a positive influence on the outcome of the trips.

Based on the experiences of this project the following recommendations can be given:

- Numbers of participants: Few participants enhance the opportunities for nature interpretation – accordingly nature plays an important role on trips with only few participants. More participants enhance opportunities for socializing, and the activities in nature accordingly are important to a lesser degree (e.g. it can be difficult to hear and listen to birds singing in the forest if many people are walking and talking together).
- Provision of activities: Few activities are better than a filled program with a variety of activities. Many activities can make the trip stressful as participants can get the feeling that there is not enough time for participating in the activities, and that they have to rush through.

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# 84 Researching, attracting and catering for 'non-traditional' visitors in South African National Parks

**Liandi Slabbert**, **Phenyo Marumo**, South African National Parks, South Africa

**Introduction**

The South African National Parks (SANParks) is a significant player in ecotourism in Africa with a vision of being a connector between societies. Yet, it has been reliant on a largely homogenous market base of loyal visitors, the majority being Caucasian middle-aged or older. Future sustainability depends on finding a balance between attracting new feasible markets and connecting to younger generations, while retaining current loyal markets. Attracting non-white and younger tourists to national parks should not just represent an opportunity for greater economic stability, "…but should transmit a stronger message that national parks remain – and will always be – a domain for all…" (Butler & Richardson, 2015). Diverse visitor experiences play an essential role in cultivating greater societal support for national parks (Weiler et al., 2013). However, little research is available to inform parks' tourism development and marketing initiatives to attract more diverse tourism markets. With financial barriers removed, what are 'non-traditional' tourists' reasons for not visiting? What are their tourism-related preferences, and how do they perceive a stay in a national park? How can they be persuaded to include a national park visit in their travel choice set?

This presentation provides a synopsis of the results of two research projects commissioned to address these research questions, followed by practical examples of how national parks in South Africa is transforming their tourism and experiential offerings and integrating new insights into marketing initiatives.

**Methods**

In 2016, a private research consortium conducted twenty focus group discussions with domestic tourists from African, Coloured and Indian populations. The 128 participants, aged between 21 and 55 years, were all in the habit of taking at least one holiday per year, but had never visited a national park before. Discussions were conducted at neutral venues and by trained moderators who matched the profile of the group participants. Another study, conducted in 2018/19 by the University of Pretoria focused on domestic Millennial travellers from African, Coloured, Indian and White populations. The first phase entailed collecting data through focus group discussions to facilitate in-depth understanding of this cohort's behaviour and decision-making. In the second phase, a sample of 4 600 Millennials living in four major metropolitan areas participated in an online survey. These studies broadly measured the following aspects of 'non-traditional' tourists: current travel behaviour and preferences; awareness and perceptions of national parks in South Africa; and expectations of nature-based tourism experiences.

**Results**

The results from the 2016 study suggested the overall mandate of SANParks is not clearly understood and that a general lack of awareness exists of the organisation's tourism brand and offerings. Various misperceptions about what a national park experience entails led to some participants not being open to the idea of visiting, indicating they would be reluctant to switch annual holiday destinations as they risk disappointment. However, most were willing to test it on a weekend breakaway basis. The findings further indicated that convenience and comfort were important to this market, and that some segments of the market expected luxurious accommodation where meals are provided or easily accessible. Interestingly, the holiday stokvel group seemed more open to experimenting with new destinations and would be a good platform for raising awareness about SANParks tourism offerings to the broader public. A stokvel travel club uses group buying power to bargain for discounted accommodation and activities while helping individuals save and plan for a holiday.

The 2018/19 Millennial study findings indicate that South African Millennials enjoy various destinations, accommodation types, and activities, with considerable levels of interest in nature-based activities. Price is a significant influencer of destination

choice, and special offers and competitions can be used to persuade them to visit a specific destination. Preferred marketing channels were also identified (Douglas et al., 2019). By showcasing the different experiences and accommodation types available in national parks and coupling this with discounted offers, SANParks could likely attract more Millennials to its destinations.

**Discussion**

Both studies were highly exploratory but filled an important gap in academic and practitioner understanding of non-visitors to nature-based tourism destinations. The results offer insights into how this market views national parks; reasons for non-visitation and likelihood to visit in future; and preferences and expectations of nature-based tourism destinations. Such understanding improves national parks' ability to attract and cater to new markets, leading to greater societal support (Weiler et al., 2013) and improved financial sustainability, securing the future of national parks.

In recent years, many significant tourism developments have been effected in South Africa's national parks to attract and cater to the 'non-traditional' tourist. These include outsourcing several camp restaurants to well-known franchises; introducing spa's; and installing Muslim prayer facilities and ablutions. One of the most significant developments is a 128-bed hotel in the Kruger National Park offering various facilities that enhance guests' comfort and convenience. SANParks' digital marketing messages abound with photos of young people from different races enjoying adventure activities in various parks. Specials are offered regularly for off-peak visitation, and the 2020 Black Friday sale received considerable uptake. The latest initiative is a stokvel and travel club offer with special payment terms and discounted rates for accommodation in selected parks. SANParks recently launched a reality TV series in 2021 to expose African viewers and participants to its parks. Lastly, throughout parks, interpretation sites and material are reviewed and enhanced to include more culturally inclusive messages.

The diversification of visitor demographics in South African national parks is happening steadily but slowly. Opportunities for future research include more in-depth studies measuring the efficacy of brand improvement initiatives; gaps between 'non-traditional' tourists' expectations and experiences, and resultant return rates and loyalty towards national parks.

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# Exploring the use of GPS tracking of tourism and recreation in natural parks

| SESSION | PART | DATE | TIME | CHAIRS |
|---|---|---|---|---|
| 6C | - | Wednesday 18th August | 20.00 – 22.00 CET | Erik Meijles |

| | Programme |
|---|---|
| *6C* | **26** Using GPS monitoring to develop tools for managers to assess the impact of management interventions on visitor densities and bird populations |
| | **35** Motivations and spatial behaviors of urban-proximate park visitors: Complexities and interactions |
| | **48** Modelling visitors' movements of nature-based tourism from social media data |
| | **162** Human mobility patterns in outdoor recreational areas based on GPS-tracking data |
| | **87** Using AIS tracking to assess recreational pressures in relation to ecologically sensitive areas in coastal marine environments |

# 26 Using GPS monitoring to develop tools for managers to assess the impact of management interventions on visitor densities and bird populations

**Rogier Pouwels**, **Michiel van Eupen**, **Dennis Walvoort**, **René Jochem**, Wageningen Environmental Research, WUR, Netherlands

**Introduction**

Achieving objectives for outdoor recreation as well as nature conservation in protected areas is a challenge as outdoor recreation can have negative impacts on nature (Larson et al. 2016). To manage the potential conflict between outdoor recreation and nature conservation, managers often need to intervene. One of the most common interventions is restricting visitors access (Hammitt et al. 2015). Although the necessity for such restrictions is easy to explain, managers need information on the effectiveness of these interventions. As visitor densities vary across protected areas and the combined impact of all visitors is difficult to assess, managers often lack this information. Here we present an approach based on GPS-tracking and bird monitoring, managers can use to assess the impact of different access scenarios for the New Forest, UK. For most part the approach and results have been describe in Pouwels et al. (2020).

**Method**

The used GPS-dataset has been collected in the New Forest during the breeding season in 2004 at several car parks. After outlier-removal, we used a travelling salesman's route algorithm to derive the most likely route visitors followed from the itinerary information of the tracks. For car parks with more than 10 routes we created a map of the expected visitor densities at the different paths resulting in a final dataset based on 36 car parks, a quarter of all car parks. A random forest model was developed to estimate the importance of landscape and environmental variables in explaining the spatial variation of visitor densities for the combined set of 36 car parks. We used this model to predict visitor densities for the other car parks to create a visitor density map for the whole area. The map was overlayed with distribution data of European nightjar (Caprimulgus europaeus) to assess the impact of visitor disturbance on the population size of this species. The European nightjar is one of the protected species in the New Forest and sensitive to disturbance.

To illustrate the use of the approach we created three reference scenarios and three intervention scenarios to assess the impact of changes in car park use on the population size of the European nightjar. Intervening in changes in car parks will not only have an impact on the population size, but also on visitors itself and we also assessed the percentage of visitors that will be affected by the interventions. The scenarios are:

1. No access: this scenario illustrates the maximum potential of the area for the Nightjar population.
2. Increase in visitors of 10%: this scenario was chosen together with the third scenario to give managers an indication of the sensitivity of the impact given a minor increase or decrease in visitors.
3. Decrease of visitor of 10%: -
4. Closing small car parks: All car parks with the capacity of less than 20 cars were considered closed. This scenario was chosen as small car parks might have a relative large impact on breeding bird densities compared to large car parks.
5. Closing three car parks: In this scenario we focused on suitable habitat and closed three relative isolated car parks that are located near areas with high numbers of breeding pairs.
6. Closing all but 20 car parks: In this scenario all visitors were distributed over 20 car parks evenly. This most extreme intervention was expected to concentrate visitors, resulting in large undisturbed areas and an increase in population size of European nightjar. The number of visitors per car park correspond with the two car parks that are used most in the current situation.

**Results**

As might be expected, the random forest model showed that distance to car park is the most important variable to explain the spatial variation of visitor densities (e.g. Meijles et al. 2014). Other important variables in the New Forest are distance to tarmac roads, openness (total visible area and variation in openness) and path type. Given the estimation that 13.3 million people visit the area each year, the random forest model estimated that visitor densities in the New Forest vary between 0 and 600 000 visitors per ha per year.

The reference scenarios show that a potential population size of 805 breeding pairs of European nightjar might be present in the New Forest when recreation is banned completely, implying that current recreational use lowers the population size by 38%. Only the third intervention, closing all but 20 car parks, shows a large impact on the population size (Table 1). However this will have an impact on at least 90% of the visitors. Scenario 5 shows that for each percentage of redistributed visitor, population size might increase with one percent. However, the number of locations where this potential might be achieved is limited. These insights help managers to discuss interventions with local stakeholders.

| | scenario | breeding pairs New Forest | breeding pairs (increase %) | redistributed visitors |
|---|---|---|---|---|
| references | current (actual in 2004) | 498 | | |
| | 1: without recreation | 805 | 62% | 100% |
| | 2: - 10% visitors | 516 | 4% | 10% |
| | 3: + 10% visitors | 483 | -3% | 0% |
| interventions | 4: close small car parks | 500 | 0% | 9% |
| | 5: close 3 car parks | 515 | 4% | 3% |
| | 6: close all but 20 car parks | 705 | 42% | 91% |

*Table 1 Impact of three reference scenarios and three intervention scenarios on the population size of European nightjar and the visitors itself.*

**Discussion**

For this study we used an already available dataset of GPS-tracks to understand what drives visitor patterns and densities in nature areas (Beeco et al. 2014). We developed a random forest model for managers to predict the impact of potential interventions. For our scenarios we focused on reallocating visitors, but interventions such as closing specific sites and changes to path type or vegetation type could also be assessed. Although the potential of the model is illustrated, the used approach requires a lot of data. Collecting and preparing the GPS-data for analyses is time consuming (see also Meijles et al. 2014). A drawback of the approach is that the random forest model is only applicable for the New Forest. Still we think these type of analyses are promising as they take into account the complexity of the relationship between different interacting variables and visitor densities. They also provide detailed information on visitor densities and preferences that can be used in agent-based recreation models like RBSim and MASOOR. These agent-based models can be made site-specific with local knowledge and local data more easily (Pouwels et al. 2011).

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# 35 Motivations and spatial behaviors of urban-proximate park visitors: Complexities and interactions

**Abigail Sisneros-Kidd[1,2]**, **Ashley D'Antonio[3]**, **Christopher Monz[4]**, **Milan Mitrovich[5]**, [1]University of Wyoming, USA. [2]Utah State Univeristy, USA. [3]Oregon State University, USA. [4]Utah State University, USA. [5]ICF International, Inc., USA

Increases in visitor use of parks and protected areas (PPAs) worldwide are challenging managers' ability to provide for a quality visitor experience while also maintaining the integrity of natural resources (Geng et al., 2021). In urban PPAs, high levels of use by a diverse population of recreationists are often observed year-round. Further, these areas often serve larger conservation purposes, such as protecting wildlife habitat, and tend to be understudied compared to larger PPAs situated in more rural areas (Hockett, Marion, & Leung, 2017; Wolch, Bryne, & Newell, 2014). Understanding visitor motivations and spatial behaviors are important for effective management of PPA resources and providing quality visitor experiences. However, visitor motivations and spatial behaviors are often studied separately, with visitor motivations studied via visitor surveys and GPS-based tracking methods utilized to examine visitor spatial behavior patterns. Previous efforts to link this data to examine differences in spatial patterns as a result of visitor motivations have proven inconclusive (e.g., Newton 2016 and Beeco et al., 2013) or focused on a single user type (Frey et al., 2018). Further, previous research examining visitor motivations and spatial behaviors has focused on a single activity type in a small sections or areas of larger, often rural, PPAs.

This study examined differences in visitor spatial behavior patterns for bikers and pedestrians as a function of differences in visitor motivation type across several interconnected, urban-proximate PPAs in Orange County, California, USA. The study area provided visitors a wide array of highly accessible destinations to engage in multiple recreation activities, including mountain biking, hiking/walking, running, and equestrian use. A paired visitor survey and GPS-based tracking effort was employed to collect data on visitor characteristics and spatial behaviors. Spatial data was collected using GPS-based tracking methods, and motivation type was derived from multivariate statistical analysis of a 36-item visitor motivation scale that appeared on a paired survey instrument. The motivation scale consisted of 36 Likert-style questions derived from the Recreation Experience Preference (REP) scale widely used to understand visitor motivations on public lands in the United States. Visitors to six different recreation areas in Orange County, CA, USA were randomly selected to participate in the research during the months of May and October, 2021. Each recreation area was sampled for three non-consecutive days between the hours of 7am and 7pm, stratified to include both weekend and weekday days. Visitors were asked to carry a GPS unit with them while recreating, and complete a survey upon the completion of their visit.

In addition to multivariate statistical analysis of visitor motivations, a three-way Analysis of Variance examining the relationship between a suite of visitor spatial behaviors and activity type (mountain bike vs. pedestrian), motivation type, and recreation area visited, and a spatial analysis of visitor dispersion were employed. Results suggest that the relationship between visitor motivations and spatial behaviors is complex. In this study, two distinct visitor types were identified based on visitor motivations—visitors motivated by immersion in nature, and visitors motivated by fitness. Visitor motivation type did influence spatial behavior patterns, but motivations were not the only factor influencing spatial behaviors. Visitor motivation type, landscape factors, and activity type all interacted to influence visitor spatial behavior patterns while recreating (Figure 1).

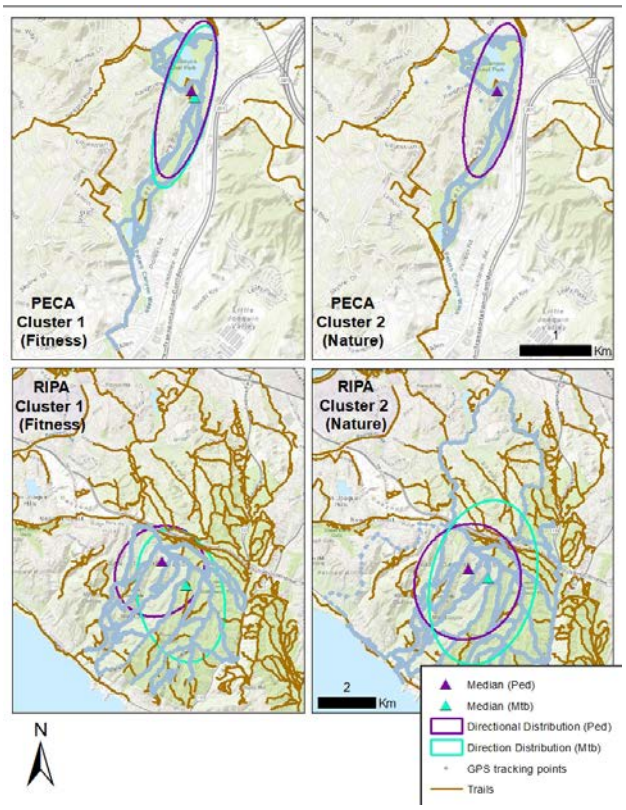


*Figure 1. Differences in visitor dispersion for pedestrians (purple ellipse) and mountain bikers (teal ellipse) with visitor GPS-based tracking points illustrating visitor spatial behavior patterns (grey lines) for different activity types and visitor motivation clusters for two different Reserve units. PECA Cluster 2 had no mountain bikers, thus only data for pedestrian visitors is presented in that frame.*

Findings also illustrated that motivation type influenced visitor dispersion, or distribution throughout the trail system, but the patterns of dispersion (whether dispersion was higher or lower for visitors with different motivations) varied by recreation location. While these site levels differences can help land managers understand how different types of visitors are using their individual urban recreation destinations, these findings do not elucidate any consistent patterns related to how motivations alone influence behavior. Our findings do suggest that visitor motivations interact with setting attributes and visitor preferred activity type to influence spatial behavior. Moreover, these interactions are complex. Ultimately, understanding the complex nature of motivations' influence on visitor spatial behaviors can help land managers improve planning for outdoor recreation in urban areas by predicting where use may increase, how visitors might behave, and highlight locations where future research may be warranted.

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# 48 Modelling visitors' movements of nature-based tourism from social media data

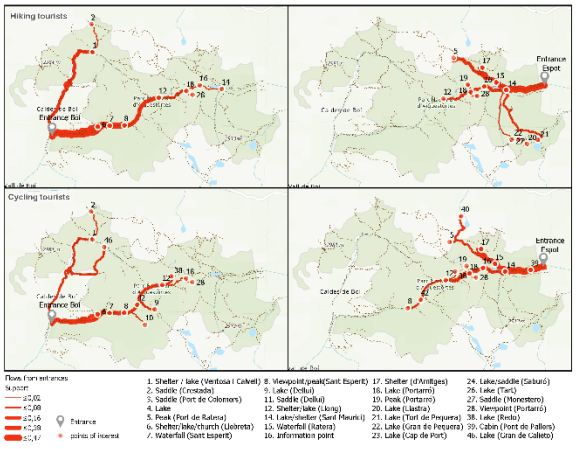
**Carolina Barros**, Universidad Complutense de Madrid, Spain

Trails are an important resource for recreation and tourism in protected areas. They enable visitors' access to the main points of interest within a protected site and help preserve the protected ecosystems by restricting the visitors' dispersion. However, the increase in the use of trails can lead to negative impacts on natural resources. For example, soil erosion and vegetation loss are amongst the typical impacts of intensive use of trails.

Thus it becomes necessary to identify and measure visitors' behaviour on trails. The conventional way of measuring use intensity is through surveys and counters. The dissemination of GPS devices has open opportunities to collect precise and complete data on how visitors move and their itineraries.

More recently, the rise of smartphones together with web 3.0 has allowed the abundant production of GPS tracks that users from all over the world regularly share on specialized social networks such as those dedicated to outdoor activities. Among these networks, the Spanish platform Wikiloc stands out, bringing together about 20 million routes in 2020.

These new data sources have advantages for studying visitor movement within trails because of their granularity in terms of spatial and temporal scale. In addition, the large amount of data that users upload provides opportunities to analyze visitor behaviour in places where data is scarce or non-existent.




This study uses GPS data from the route sharing site, Wikiloc, to identify and map the visitors' movement within the trail network of a protected area. Using the Aigüestortes i Estany de Sant Maurici National Park as a case study, we aim to answer the following research questions:

1. Where most visitors go?
2. Which are the trails that attract most visitors and which are neglected?

The Aigüestortes I Estany de Sant Maurici National Park was created in 1955 and is located in the Catalan Pyrenees, in Spain. The park has 14,119 hectares and constitutes the most important lake area in the Pyrenees. For this reason, water is the main protagonist of this space and its sign of identity since it has more than 200 lakes or ponds. The park receives an average of 550,000 visitors per year, and it is the 5$^{th}$ most visited park of the Spanish national network.

This research purpose is to identify movement patterns of adventure visitors within a protected area. There are different methods for analyzing movement within GIS which can be used on geotagged data. We applied a method that combines spatial statistics and tracking analysis to identify: Trail use density, Flows from main entrances and general sequence patterns.

The first step of our methodological approach was to colled the data from Wikilok. GPS tracks of Aigüestortes National Park were downloaded from the Wikiloc site in January 2019. We used the park's name in English and Spanish as keywords to search for all available tracks. To visualize and analyze the tracks, we converted the gpx files into point feature classes using ArcGIS 10.6 software. An early exploration of the converted tracks allowed for the identification and removal of inconsistent tracks. After data depuration, we used the timestamp and XY coordinates of the track points to calculate the tracks' movement vectors. Movement vectors are derived from GPS data by computing the speed, direction, duration and distance between a consecutive pair of GPS records (Moreira et al. 2010). In order to identify

| *Activity* | *# tracks* | *Duration (min) average* | *Duration (min) maximum* | *Duration (min) minimum* | *Distance (Km) average* | *Distance (Km) maximum* | *Distance (Km) minimum* | *Speed (km/h) average* |
|---|---|---|---|---|---|---|---|---|
| **Hiking** | 320 | 337 | 718 | 22 | 12 | 24 | 1,1 | 3,33 |
| **Cycling** | 190 | 296 | 1060 | 15 | 12 | 51 | 0,8 | 6,71 |
| **Total (mean over total)** | 510 | 317 | 889 | 19 | 12 | 37,5 | 1,0 | 5,02 |

and measure the visitor flows from the park entrances, we built a flow map based on the first point where the visitors started their track and the stops they made during the tracks.

The local statistics of a set of movement vectors can identify spatial clusters of low-speed values. To identify the places where visitors stopped from the GPS points, we calculated Moran's local spatial autocorrelation Index to the points and selected the low-low clusters as the stops. Then we performed a Kernel density analysis on the LL clusters to select areas with higher density and overlay these areas with a POIs from the park to extract only the ones where people stopped.

The next step was to extract the GPS Points from every track within the high density areas. From these points, we calculated the order in which each site was visited based on their timestamp. Finally, we counted the number of tracks per each segment between the stops. The result was a line layer with the trail density per segment that allows us to build a flow map and a density map.

**General Results**

Tracks uploaded by month show a seasonal visitation pattern, which is in line with official visitors' numbers of Aigüstortes national park. Cycling routes were found on more trails than hiking routes. Both maps showed a differentiated behaviour of the two types of visitors analyzed, hikers and cyclists. Visualization of hiking and cyclist flows allows identifying which trails are the most used and which are neglected by the visitors.

# 162 Human mobility patterns in outdoor recreational areas based on GPS-tracking data

**Karolina Taczanowska[1], Artur Mazur[2], Christiane Brandenburg[1], Christina Czachs[1], Barbara Latosinska[1], Joanna Hibner[3], Xavier García-Massó[4], Alberto Pardo[4], Luis-Millán González[4]**, [1]University of Natural Resources and Life Sciences, Vienna, Austria. [2]Kozienice Forest District, Poland. [3]Jagiellonian Univesity, Cracow, Poland. [4]University of Valencia, Spain

**Introduction & study objectives**

New trends in leisure and outdoor recreation show an increased penetration of remote areas and the development of spatially unconstrained outdoor recreational activities (Bielanski et al, 20218; D'Antonio & Monz, 2016; Meijles et al, 2014; Taczanowska et al, 2014; Taczanowska et al, 2008). Here we present the application of GPS tracking to monitor visitor behaviour in a popular nearby recreation destination located in the Kozienicka Primeval Forest, Poland. Particular focus of the study was investigation of the spatial and temporal behaviour of hikers in the forest, detection of resting locations as well as use of recreational infrastructure grouped by visitor profile.

**Methods**

The research is based upon empirical data. A combination of several visitor monitoring methods was simultaneously applied in the study area: long-term automatic visitor counting using pyroelectric sensors (Eco-Counter); online survey including PPGIS; manual counting and on-site visitor survey combined with GPS-tracking carried out on 8 sampling days in 2016-2017. A total sample of 284 GPS tracks of visitor groups combined with visitor group characteristics obtained via direct interview were analysed. ArcGIS and Matlab Software were used for spatial and statistical analyses.

**Selected results**

Our work provides detailed insights into spatial and temporal aspects of recreationists' spatial behaviour. The Kozienicka Primeval Forest (KPF) serves as nearby recreation destination mainly for surrounding cities and towns: Radom, Kozienice, Pionki (Figure 1). Accoriding to automatic counters in the field, visitation load achives up to 75302 passages per year and daily maximum of 2549 passages at most popular trail segments.

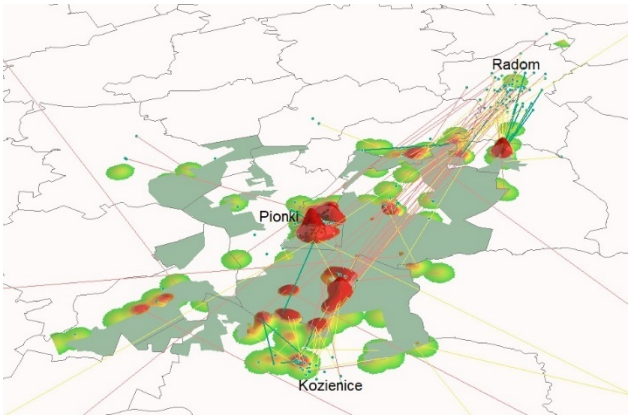



*Figure 1. Origin-destinantion analysis of nearby recreation in the Kozienicka Primeval Forest (KPF), Poland. 3D density map illustrates recreational use intensity of the forest entrances; points illustrate living places of the respondents; lines indicate origin-destination pairs during last reported recreational trip. A detailed view of a spatio-temporal animation of visitors' GPS-tracks can be found additionally* ***here****.*

Results of spatio-temporal analysis show significant differences of use among various visitor profiles. Especially, frequency of visits results in different use patterns. Visitors frequently visiting KPF (making almost 1/3 of a total sample) on avaerage spent 67 minutes in the forest and hiked 3.7 km. First time visitors and hikers visiting KPF ocasionally (38%) did shorter trips (AV: 3.3 km), while spending longer time in recreation destinantion (AV: 74 minutes). Larger visitor groups, especially those accompanied by children tend to be less active and use especially dedicated picnic spots, whereas single hikers and pairs spend less time in the forest and walk longer distances.

**Discussion & Conclusions**

Finding adequate tools enabling better understanding of visitor behaviour is crucial for an effective management of leisure activities in vulnerable environments. GPS tracking allows registering visitors'

movement trajectories to be analysed both at an individual and a collective level. The results can be practically used to improve visitor management strategies in outdoor leisure areas. We conclude that GPS tracking is a reliable tool allowing monitoring of recreational use assigned to infrastructure (such as dedicated hiking trails or picnic spots) as well as spatially unconstrained outdoor recreational activities.

**Acknowledgements**

Authors would like to express their gratitude to colleagues from State Forests National Forest Holding in Poland for initiating the research and successful collaboration at all stages of the project. We would like to thank all the involved persons. We owe special thanks to Anna Pikus and Maria Rothert from the Department of Social Functions of Forest as well as to Artur Mazur and his team for great support and engagement while carrying out the fieldwork in the Kozienicka Primeval Forest.

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# 87 Using AIS tracking to assess recreational pressures in relation to ecologically sensitive areas in coastal marine environments

**Erik Meijles[1]**, **Michiel Daams[1]**, **Bruno Ens[2]**, **Jasper Heslinga[3]**, **Frans Sijtsma[1]**, [1]Rijksuniversiteit Groningen, Netherlands. [2]Sovon Dutch Centre for Field Ornithology, Netherlands. [3]NHL Stenden University of Applied Sciences, Netherlands

In nature rich coastal areas, increasing numbers of recreationists may exceed ecological capacities. At the same time, recreation in such areas may increase nature awareness and appreciation by the general public, ultimately leading to a more sustainable landscape management (Libosada, 2009). In order to balance nature-based tourism and natural values, careful monitoring of visitor flows is a prerequisite for nature and recreational management (Meijles et al, 2014). The monitoring traditionally takes place based on visual observation and patrolling, but this is time consuming and does not provide full temporal coverage or overview of the entire coastal area. With this paper, we show how recreational boating can be monitored throughout the recreational season using the globally available data from the automatic identification system (AIS) for vessels. We have developed a method to convert AIS data to easily interpretable information on visitor flows and investigated whether AIS can provide insightful visitor monitoring information by overlaying ship movement data with nature conservation policy targets and ecological value maps.

For this study, we have used the Dutch sector of the Wadden Sea UNESCO Natural World Heritage Site as research area. The area is characterised by a shallow sea with tidal flats and deeper tidal natural channels (Elias, 2017). The salt marshes, tidal flats, mussel banks and sublittoral areas provide a high availability of food to large numbers of migratory and ground-breeding birds, of which some are protected under the Natura 2000 regulations. They are susceptible to human disturbances during feeding, moulting and roosting (Kloepper et al, 2017). The Wadden Sea also is home to two seal species, functioning as reproduction area for the harbour seal in summer and for the grey seal in winter. They forage in the area and rest on the edges of the tidal flats at low tide. Seals run the risk of being disturbed by people coming close during low tide at haul-out sites and in periods when females are suckling young.

Because of its beauty, the scenic landscapes and the high ecological values, popular recreation activities in the Wadden Sea include sailing, anchoring, mudflat hiking, looking for mussels/oysters, and seal and bird watching (Sijtsma et al., 2012). Typical for this region is tidal flat mooring ('droogvallen' in Dutch), in which flat-bottomed boats rests on the tidal flats at low tide, providing the opportunity to get off board and to explore nature in the surroundings (Meijles et al., 2021). However, this may disturb resting seals or foraging birds, and therefore, this should preferably not take place in or close ecologically sensitive areas. The monitoring of tourism is reasonably well established in the area and policy programmes are in place to combine tourism and nature protection in a sustainable way (Van Roomen et al, 2012). However, much of the monitoring is based on direct observation and patrolling, and the area would benefit from full seasonal spatiotemporal patterns of recreational ships at the landscape scale as a baseline assessment for recreational pressure on ecological values. Therefore, the region is a relevant case for researching spatiotemporal dynamics of recreation in sensitive marine natural areas.

For our research, we used high-resolution AIS data (nearly 9 million data points) of recreational ships to create spatiotemporal patterns for the recreation season May-September 2018. We combined this with data about shipping lanes, bathymetry and tides. Using a GIS-based hotspot analysis including tidal conditions, we mapped areas with relatively high recreational shipping densities and tidal flat mooring locations for the full study area at the seasonal scale. Subsequently, we overlaid AIS data with ecological data, such as seal resting places, bird high water resting places, important shore bird foraging locations and Marine Protected Areas (MPAs).

We showed that most of the recreational traffic is concentrated around the tidal channels. We were able to map popular tidal flat mooring locations and observed that there is a relatively high rate of

tidal flat mooring activities in only a few Marine Protected Areas. In addition, we showed that in most of the seal resting places, recreational vessels stay at a distance. Most ships generally stay away from seal resting places, but in a couple of areas, ships regularly come closer than official regulations. In general, the vast majority of tidal flat mooring activities stay away from the mussel banks, which with their direct surroundings are important foraging places for shore birds. However, particularly in the eastern part of the Wadden Sea, we have observed some 'hotspots' of tidal flat mooring relatively close to mussel banks. Although this provides opportunities for recreations to go bird-watching, off-board activities may disturb foraging birds, running the risk that they miss their low tide window of opportunity here. The hotspot maps therefore provides localised insights in potential disturbance problems at the seasonal time scale and could thereby provide an important lead for patrolling specific focus areas. Further visual observation is needed here more regularly to see to what extent the proximity of recreational ships may lead to disturbance.

We can conclude, that combining AIS data with ecological indicators can provide valuable information on recreational activities at the seasonal scale for the entire Dutch sector of the Wadden Sea and where these may conflict with ecological values or nature protection policies. Such information may be useful to steer visitors away from ecological sensitive areas or in sensitive periods, where at the same time it can be used to inform recreationists where nature can be best experienced. Future research by combining AIS analysis with field patrolling data would provide insight into the effectiveness. In addition, using AIS, possibly enriched with radar data, may be useful to study the relationship between recreationists and ecological values in focus areas on shorter time scales.

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# From place-based resources to value-added experiences: Future perspectives on Nature-based tourism

| SESSION | PART | DATE | TIME | CHAIRS |
|---|---|---|---|---|
| - | - | Thursday 19th August | 10.00 – 11.30 CET | Peter Fredman |

**Programme**

**9** From place-based resources to value-added experiences: Future perspectives on Nature-based tourism

# 9 From place-based resources to value-added experiences: Future perspectives on Nature-based tourism

**Peter Fredman[1,2]**, **Jan Vidar Haukeland[3]**, **Petter Dybedal[3]**, **Knut Bjørn Stokke[1]**, **Magnar Forbord[4]**, [1]Norwegian University of Life Sciences, Norway. [2]Mid-Sweden University, Sweden. [3]Institute of Transport Economics, Norway. [4]Institute for Rural and Regional Research, Norway

Nature-based tourism is framed and flavored not only by the socio-economic conditions of the region where it occurs, but just as much by natural resources and opportunities to make use of them in a tourism context. This session summarizes five years of research on nature-based tourism in the BIOTOUR project and discuss future prospect of this sector in the light of a greener economy, more robust communities and sustainable practices. It will also present key content from the recently published book "Nordic Perspectives on Nature-based Tourism. From place-based resources to value-added experiences", edited by professors Peter Fredman and Jan Vidar Haukeland.

The first part of the session consists of a series of short presentations: An overview of BIOTOUR; key findings and research approaches from the five work-packages (nature-based tourism in the bioeconomy, resources, markets, tourism actors and innovative products); an international (outside) reflection on the research; and reflections from stakeholder organizations supporting the project. The second part of the session will be a round table discussion, where all participants are invited to discuss the following questions:

- Pros and cons of large and multi-disciplinary research projects with stakeholder involvement
- What's next for nature-based tourism in a Nordic context – challenges and opportunities ahead
- Future research – needs and formats

**The BIOTOUR project**

BIOTOUR is funded by the Norwegian Research Council 2016-2021 with the aim to research and disseminate key conditions for future development of nature-based tourism in the bioeconomy that contribute to business innovation, community resilience and sustainable use of resources in a Norwegian context. For this purpose, data was collected internationally, nationally and in several case-study areas reflecting significant nature-based tourism settings: Coastal mountains and fjords (Hardanger region), Boreal forests (Trysil region), and Arctic north (Varanger region). This data also captures many of the significant features of nature-based tourism in the Nordic region, stretching from the rugged mountainous western parts to the more forested east and agricultural dominated lands in the south. This region is known for a progressive bioeconomy, including service industries such as nature-based tourism. Much of the region also share long traditions of outdoor recreation practices (friluftsliv) and good accessibility to nature through rights of public access – both important for the opportunities and challenges of future growth in nature-based tourism.

To capture the "mosaic of knowledge" needed to successfully develop nature-based tourism, the project is organized as five integrated work packages for research and two supporting work packages for outreach, communication and administration (Figure 1). This also implies close collaboration with key national stakeholders of the Norwegian nature-based tourism sector, including Norwegian Hospitality Association, Norwegian Farmers Union, Norwegian Trekking Association, Innovation Norway and Hanen – all represented in a reference group which closely follow the project. Additional stakeholder collaboration at the local level takes place in the case study areas Hardanger, Trysil and Varanger. This includes interviews, workshops, focus-groups, excursions and conferences.

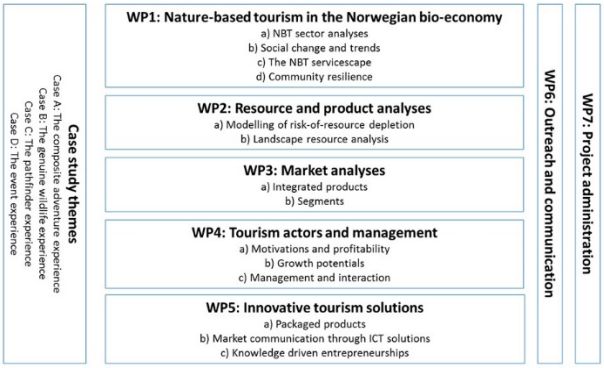


*Figure 1. Organization of the BIOTOUR project.*

**Selected findings**

Results from the national inventory of nature-based tourism service providers shows that firms in this sector contribute to the robustness (resilience) of local communities in different ways: Economically through increased diversity of the business sector, socially through development of networks and infrastructure, and environmentally through care for nature and the cultural landscape. Workshops with local tourism stakeholders and communities in Varanger and Trysil show that nature and culture-based resources need to be closely connected to successfully develop tourism. Further analyses also demonstrate that dialogue-oriented processes can be fruitful planning approaches to deal with the social dimensions in small municipalities. Trends in nature-based tourism are studied with the help of over 60 experts from Norway, Sweden, Finland, the European Alps and the Western United States. Experiences from local culture and locally produced products and food is a recurrent, while the Norwegian expert panel also rates sustainability and responsible travel high.

A border-survey among foreign tourists show that hiking in forest- and mountain areas, and experiences of the Norwegian landscape, are central components. The follow-up e-mail survey shows that most people prefer physical activities over more passive experiences of beautiful nature. When it comes to management of nature areas for tourism, availability and accessibility, maintenance of trails and signs are highly ranked features. Interviews with business operators show that an important motivation to start up a business in nature-based tourism is the possibility to turn a lifestyle into an economic sustainable tourism product. New ways of thinking and networking is important for product innovation. A visitor survey among muskox safari participants in Dovrefjell demonstrates the role of interpretation and the importance of the guide for the tourist experience.

Research in BIOTOUR also shows a need for closer collaboration between municipalities and management organizations of protected areas. We suggest that visitor strategies should be integrated with the physical planning according to the Planning and Building Act. A PhD- thesis that analyses the provision of tourism experiences in climbing parks, sea kayaking, ski touring and mountain biking shows a high degree of dependence on the characteristics of natural resources. The providers' dedication is, together with the experience, activity and place, the core of the nature-based tourism product. These items in combination make up the key driving force, a "glow", that characterizes many nature-based tourism producers. An experiment with 733 participants to analyze the impact from mobile phone applications on the nature-based tourism experience shows that planning and navigation are key functions for the total experience. The study reveals that opportunities for «digital disconnection» are important to provide deeper nature experiences. There are an increasing number of outdoor cultural and sport events around Norway visited by domestic and foreign tourists. Interviews with event organizers has revealed the significance of nature when designing such event, as well as how different natural resources can contribute to learning, memorable and transformative experiences.

**References**

Fredman, P. & Haukeland, J.V. (Eds.) 2021. Nordic Perspectives on Nature-based Tourism: From Place-based Resources to Value-added Experiences. Edward Elgar Publishing, 328 p.

# Impacts from climate change on recreation and nature-based tourism

| SESSION | PART | DATE | TIME | CHAIRS |
|---|---|---|---|---|
| 7A | I | Thursday 19th August | 12.00 – 13.20 CET | Jeff Dalley |
| 8A | II | Thursday 19th August | 13.30 – 14.50 CET | Jeff Dalley |

| | Programme |
|---|---|
| *7A* | **185** Weather sensitivity of visitation to Protected Natural Areas: Establishing trends and trajectories in a time of changing climate. |
| | **165** Climate change: impacts on outdoor activities in the summer and shoulder seasonsin Austria - lessons learned. |
| | **120** Threats to natural world heritage sites from visitors, climate change and transportation: A management perspective |
| | **16** Zero impact nature-based tourism |
| *8A* | **109** The influence of wildfire and smoke on recreation visitation and behavior |
| | **119** Nature-based tourism and renewable energy infrastructure: tourism industry's perceptions of the impact area of power plants on tourism |
| | **90** Exposure, meanings and landscape-technology fit. A hierarchical analysis of people's preferences towards landscape related energy scenarios and what they are based on |
| | **158** Climate change and the demand for recreational ecosystem services on public lands in the United States |

# 185 Weather sensitivity of visitation to Protected Natural Areas: Establishing trends and trajectories in a time of changing climate.

**Jeff Dalley**, **Dong Wang**, New Zealand Department of Conservation, New Zealand

**Background**

A major determinant of visitor use of outdoor recreation opportunities in PNAs is ambient weather at place – specifically, the four key variables of temperature, humidity, wind speed and solar radiation. Visitors routinely assess ambient weather before undertaking a range of recreational activities in the outdoors, evaluating the key variables – individually and in combination - relative to both personal preferences and the planned actvity at place. Weather at place may vary widely from year to year, masking underlying changes in visitation demand. Furthermore, the influence of ambient weather conditions on visitation varies widely from place to place, such that the same conditions may deter a significant number of visitors to one place, while generating little to no deterence at others - and may even encourage visitation.

Consequently, understanding the influence of weather on visitation is a core consideration for visitor management at the operations level, but increasingly also at the strategic investment level as historic weather patterns are modified by climate change. However, at the place/destination scale of analysis, separating the influence of weather on visitation from other influences, such as visitor preference, is complex; when the scale of analysis expands to the national level, the challenge becomes daunting. Nevertheless, PNA managers need to make informed decisions on long-term investment in visitor services and infrastructure based on underlying demand trends and trajectories, and the extent to which these are influenced by weather is therefore a critical consideration. To address this current uncertainty, the New Zealand Department of Conservation (DOC) has developed a statistical tool to quantify the weather sensitivity of several hundred visitor destinations across its portfolio of PNAs.

**Method**

Adopting an Artificial Intelligence (AI) approach, an Artificial Neural Network (ANN) was developed to analyse complex weather data from New Zealand's national network of actual and virtual weather stations, and visitation data from DOC's national network of activity (visitor) counters. Compared to conventional statistical models, ANNs are proven to have a more powerful predictive capability. Leveraging these ANN advantages, a weather-sensitivity tool is introduced. This tool is used to:

1. quantify and explain which weather variable(s) amongst a range of confounding variables are most influential on visitation at the destination scale;
2. predict underlying weather-adjusted visitation levels at the destination scale;
3. establish visitation weather-sensitivity at the regional scale.

Based on this analysis, the tool derives a generic weather index for each destination that identifies the individual and combined effect of the four key weather variables. The index is in turn interpreted as a simple weather sensitivity scale to communicate for operational and planning purposes the degree to which visitation levels at destination and regional scales are influenced by weather. This analysis can be further extended to remove the weather signal from visitation levels, allowing the underlying (weather-adjusted) trend in visitation demand to be revealed. Combined with trajectories of changing weather patterns derived from climate models, more robust and resilient investments in PNA visitor services and infrastructure can be made.

**References**

Dr Jeff Dalley, Principal Technical Advisor (Social Monitoring & Evaluation), New Zealand Department of Conservation. Dong Wang, Senior Statistician, New Zealand Department of Conservation

# 165 Climate change: impacts on outdoor activities in the summer and shoulder seasonsin Austria - lessons learned.

**Ulrike Pröbstl-Haider**, **Claudia Hödl**, **Kathrin Ginner**, **Borgwardt Florian**, University for natural resources and life sciences, Vienna, Austria

The summer tourism market in Austria builds significantly on the country's opportunities for outdoor recreation such as mountaineering, mountain biking or water sports. This presentation looks at the most important activities from a tourism perspective and considers the likelihood of impacts by climate change based on an extended literature review.

It also examines current trends in tourism demand and concludes with both general and activity-specific adaptation and mitigation measures. The data collection and review process covered the relevant peer reviewed and grey literature. This comprehensive process was based on, and was open to, contributions by the full scientific community of relevant Austrian researchers and experts. The compilation process of the report followed quality standards such as the involvement of international partners as review editors within the review process.

The effects of climate change are already clear to see (Pröbstl-Haider, Lund-Durlacher, Olefs, Prettenthaler 2020). For example, average annual air temperature in Austria has risen by almost 2 °C since the end of the 19th century – roughly twice as much as the global average. A further temperature increase of 1.3 °C by 2050 (compared to the mean of 1971-2000) can be expected, regardless of the different emission scenarios. This warming is accompanied by an increase in heat stress (longer and more intense heat waves) and more frequent extreme drought events due to increasing evaporation.

Rudel et al. (2007) tried to summarize the effects of climate change on alpine summer tourism considering different bio-climatic parameters . According to their findings, the following effects are likely to occur:

- The number of days with heat stress will increase but tourism destinations above 1000m will not be affected.
- The number of days with thermally comfortable conditions for outdoor recreation activities will increase (+10 days).
- The number of days with sunshine will increase but this effect is limited to destinations in higher elevations.
- The number of days with no or little precipitation will increase and days with foggy conditions will decline accordingly.
- Days with significant precipitation will increase.

Without climate protection measures, it is also assumed that a significant increase in the intensity and frequency of small-scale extreme events (local heavy rain, floods, thunderstorms and hail) can be expected, and that subsequent effects such as landslides and mud flows can occur. Burdens for the guest also result from a change in biological conditions, in particular from an increase in harmful insects, an increase in algal growth in warmer waters and from the spread of neophytes and allergenic plants. During all activities outdoors, considerable health problems can arise from increased heat. This particularly applies to city tourism and events in summer.

For many activities, climate change will lead to a prolongation of the season, which is an advantage for destinations focusing on hiking, biking, swimming, water sports, air sports and golf. However, it can be shown that climate-induced phenomena will have a strong impact on many of these activities, such as climbing and alpine touring, fishing, golf, and water and air sports. Here, the impacts may even lead to a change of destination or activity. Adaptation opportunities are rather limited in these cases. For other activities, adaptation measures can be applied to maintain the existing tourism offer. Irrigation can be increased in the case of golf courses, the construction of pools is feasible to compensate for deteriorated lakes, and destroyed trails and other hiking infrastructure, such as alpine hazard protection, could be reconstructed. However, all these measures are cost-intensive and may have a negative influence on the overall holiday experience. An early warning

system via media (based on heat, thunderstorms and heavy rain) would be important to enable adaptation measures for companies and guests.

The discussion over different adaptation strategies is of great importance for tourism management. The presentation will focus on four major strategies:

- Adaptation of the natural conditions: In this case, vulnerability can be reduced by improving the natural conditions, e.g. saving water by redesigning golf courses to improve fish habitats.
- Technical adaptation of the infrastructure: Technical solutions such as irrigation, artificial pools, artificial canoe routes or the reconstruction of trails maintain the important tourism functions.
- Technical adaptation of the equipment: the goal is an improvement of the equipment in order to continue the activity (e.g. type of boat, type of hang glider).
- Awareness raising, information and early warning systems: For many activities, an early warning system would be helpful to avoid risky situations due to flooding, rockfall, thunder storms or extreme heat.

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# 120 Threats to natural world heritage sites from visitors, climate change and transportation: A management perspective

**Martin Falk**[1], **Eva Hagsten**[2], [1]University of South Eastern Norway, Norway. [2]University of Iceland, Iceland

The UNESCO list of World heritages includes both cultural and natural sites. Nature parks and cultural landscapes can assigned to the latter group. These sites are often located in sensitive areas and could be threatened by environmental pressures, climate change and crowds of visitors. Despite this, natural (as well as cultural) heritage sites are increasingly used as tools for national tourism marketing campaigns. This in in combination with signs of strong visitor growth raises the discussion of over-visitation (Adie, 2017; Job, Becken and Lane, 2017; Scuttari, and Orsi, Bassani, 2019). Subsequently, there are suggestions that the social and environmental carrying capacity of WHSs should be carefully monitored including an emphasis on information on visitor density (Shelby, Vaske and Heberlein; 1989; Kaltenborn et al., 2013). Previous research show that inclusion of natural areas in the UNESCO WHS list has a significant impact on tourism (Buckley, 2004). However, the management perspective of these aspects is still unknown.

The aim of this study is to examine the management perspective on presumptive environmental issues relating to Natural World Heritage sites. The analysis focuses on four perceptions: (i) visitor accommodation (buildings) and associated infrastructure, (ii) ground transportation infrastructure, (iii) visitor impact (iv) climate change and severe weather events. An ordered Probit model is used to estimate the perceptions of the management. Data is based on the UNESCO World Heritage Management Report 2014 and encompass 90 World Heritage sites that are either purely natural or mixed. Cultural landscapes are also included. The explanatory factors include year of inscription, size (measured as land area in hectares), type (full natural site, mixed natural site or archaeological or cultural landscape), covered by the danger list (with risk of losing the inscription) and country of location. Indicators at the country level capture the general environmental performance and attitudes.

The theoretical starting point for the analysis is the tourist carrying capacity of natural parks or sites (Manning, 2013; McCool and Lime, 2001). This capacity can be defined in different ways (McCool and Lime, 2001), by visitor density, that is, the number of visitors in a given area being a common measure (Shelby et al., 1989) or by the perception of managers or visitors.

Those natural parks that were inscribed early are long since commercialised and presumably also better known to potential visitors and thus more likely to be at environmental risk. Examples of early UNESCO listings are national parks in the United States (Everglades National Park, Grand Canyon National Park, Yellowstone National Park, all inscribed before 1980) and in Europe (Plitvice Lakes National Park in 1979). Some of these parks are now also present on the danger list (reference).

Descriptive statistics show that negative impacts from “Ground transportation infrastructure” is considered a significant problem by 26 per cent of site managers. Large visitor accommodation and associated infrastructure is slightly less negative, with 20 per cent of the managements of natural World Heritage sites or WHS cultural landscapes finding this significant. Almost a third of managers consider that there are significant negative impacts from tourism/visitors/recreation. There is, however, rare that the managers express strong negative views. The perception formulated as "insignificant impact" is the one most commonly appearing in the questionnaire.

The ordered Probit estimates show that perceptions related to tourism increase with the number of years since inscription and it decrease by size of the site. Environmental progress at the country level (growth of emissions and air pollution) also have an influence on the manager perceptions. The empirical results indicate that the commitment of society and government to corporate environmental sustainability goals is of great importance for the recognition of environmental problems and climate change. As a robustness check, the Multilevel Ordered Probit model is used where the error term is

allowed to vary across the country location of the World Heritage Site.

Several implications emerge from the empirical analysis. The major finding is that managements of natural world heritage sites in general are less concerned about the possible negative environmental impacts than for instance what is highlighted in recent research. Alternatively, they have an alternative view on the carrying capacity. Only half of the natural heritage site managers consider climate change as a significant threat, despite an ongoing rise in temperatures, for instance. One explanation behind this could be that the short term-view on operations, including economic prospects, is dominating. Environmental pressure occurring from ground transportation, visitors and accommodation are only seen as a problem by a minority of managers. This contrasts the fact that visitor pressure is one possible reason for ending up on the danger list and eventually also lose the World Heritage Site inscription.

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# 16 Zero impact nature-based tourism

**Dominik Siegrist**, **Lea Ketterer Bonnelame**, Eastern Switzerland University of Applied Sciences Rapperswil, Institute for Landscape and Open Space, Switzerland

## Introduction

The climate crisis is one of the greatest challenges of our time. Tourism can also make an important contribution to solving these problems (Lenzen et al. 2018). Nature-based tourism is thereby of particular importance. This is especially because it is generally viewed as a more ecological version compared to other forms of tourism. Nature-based tourism offers a lot of experience in the field of sustainable development. In addition, it represents a growth in tourism worldwide (Haukeland et al. 2021). It is now a matter of further developing this form of tourism into a zero impact nature-based tourism.

In 2015, as part of the Paris Climate Agreement, the international community decided to limit the average global warming to well below 2 degrees Celsius compared to pre-industrial times, with a target of 1.5 degrees Celsius increase in temperature in order to prevent the most catastrophic damage to the climate (IPCC 2018). In the wake of the Paris Climate Agreement, numerous countries have announced that they want to reduce their greenhouse gas emissions to net zero by 2050 at the latest. These climate goals result in a special challenge for tourism, which contributes significantly to global warming with its greenhouse gas emissions on a global level as well as in individual countries (Loeh, Becken 2021).

For tourism as a whole, the question arises as to which function it should play within the framework of the internationally established net zero goal. On a global scale, climate-damaging air traffic represents the greatest challenge for the tourism industry: Will tourism have to cope with significantly fewer flight kilometres in the future? How can the long-distance tourists that are no longer available in the destinations of the global south be replaced? Or will drive technologies for aircrafts be developed in the future that are climate-neutral? At a regional level of tourist destinations, too, a number of extremely relevant fields of action are affected with regard to climate protection. Mobility also plays a central role here, but there are also major challenges for the hotel industry and other areas with high greenhouse gas emissions (Gössling 2021).

## Goals and criteria for zero impact nature-based tourism

When we speak of zero impact nature-based tourism, we think of nature-based, climate-neutral tourism that will reduce its greenhouse gas emissions to net zero by 2050 at the latest. Comprehensive goals for sustainable, nature-based tourism have been defined on various occasions and substantiated with precise criteria and indicators (Siegrist, Ketterer 2017; Siegrist et al. 2019). Aspects relevant to climate protection have already been of great importance, e.g. in the area of mobility or the hotel industry. Against the background of the need to develop zero impact nature-based tourism, such criteria are sharpened here with reference to consistent climate protection.

| Target area | Characterization |
|---|---|
| Strategy and positioning | Der natur- und kulturnahe Tourismus, der Klimaschutz, die Aufwertung von Natur und Landschaft sowie die Förderung der Biodiversität besitzen in der touristischen Strategie der Tourismusdestinationen einen hohen Stellenwert. All dies bildet ein Kernelement ihrer Positionierung.<br>Nature-based and cultural tourism, climate protection, the valorization of nature and landscape and the enhancement of biodiversity have high priority in the tourism strategy of the tourist destinations. All of this forms a core element of their positioning. |
| Development of products | The tourist destinations pursue a professional development of attractive and marketable natural and cultural products, so that these offers and activities represent an essential and clearly visible part of the overall offer. The participation of the population is crucial. |
| Mobility | Sustainable, climate-neutral traffic planning is a core component of the destination strategy. The promotion of arrival and departure by public transport, e-mobility and non-motorized traffic is of central importance. Traveling by plane is avoided. |
| Protection of climate, nature and landscape | The tourist destinations make climate protection their top priority and take measures to avoid and reduce greenhouse gases. At the same time, they support the creation and maintenance of landscape and nature reserves in sensitive natural areas. If necessary, they also accept harsh visitor management measures. In doing so, they maintain active cooperation with nature and environmental protection associations. |
| Communication and marketing | Climate protection as well as the natural and landscape values form a core component of the marketing strategy of the tourism destinations; these values are actively communicated to the outside world. For example with the development and positioning of climate-neutral destinations. |
| Value added | The connection of regional value added, climate protection, nature conservation, landscape development and biodiversity enhancement is a priority for the tourist destinations. |

*Tab. 1: Target areas of nature-based tourism with the inclusion of climate protection*

For each of these six target areas, five criteria with indicators including measurement regulations are formulated. For reasons of space, the indicators are not shown here. The aim is to put tourism destinations in a position to formulate in detail the goals and measures for climate-friendly, nature-based tourism for their region and to check whether they have been achieved.

**Discussion**

Even if we do not yet know exactly what to expect in connection with global warming, it seems clear that there will be major challenges in the next few decades. Not only for nature-based tourism, but also for society and the economy as a whole, of which the travel industry is an essential part. What will a "net zero world 2050" look like? How does zero impact nature-based tourism develop on this basis? The only certainty is that such a world will have to do largely without fossil fuels. Renewable forms of energy will be used to a much greater extent than is the case today. In this sense, an outlook on a net zero nature-based tourism is associated with many open questions that can only be answered in the course of the next few years and decades.

To this day, however, climate change and the resulting need for action are hardly an issue for many tourist destinations. Some tourism officials turn a blind eye to the impending changes and see no options for taking the destinations on a climate-neutral path. But tourism, and in particular nature-based tourism that has already been sensitized to issues of sustainable development, is required to make a significant contribution to climate protection. This is not least because the climate-damaging greenhouse gas emissions from tourism are particularly high. Clearly formulated instruments such as the presented criteria for the development and implementation of effective measures can help, at the level of the individual tourist destinations as well as at a higher level.

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## 109 The influence of wildfire and smoke on recreation visitation and behavior

**Eric White**[1], **Sama Winder**[2], **Spencer Wood**[2], [1]USDA Forest Service, USA. [2]University of Washington, USA

In the U.S. West, the area burned in wildfires has been increasing in recent years leading to a greater number of burned recreation destinations. In addition, prolonged periods of dense smoke have inundated both recreation destinations and urban settings. As climate change progresses and the frequency and severity of natural disturbances, such as wildfire, floods, and windstorms, increases we need to improve our understanding of how wildfire, smoke, and burned landscapes influence recreation behavior. In this presentation, we briefly synthesize the current literature on how recreation behavior is influenced by burned landscapes and discuss findings from our recent efforts, using traditional and crowd-sourced approaches, to understand the response of recreationists to wildfire and smoke. The research literature exploring how burned landscapes influences recreation use levels in the U.S. West is limited (McCaffrey et al 2013). Stated-preference studies exploring the welfare implications for recreationists from hypothetical burned landscapes account for much of the literature (Bawa 2017). Fewer studies have been completed on actual burned landscapes. In general, research conducted in-situ has found that any reductions in recreation visitation in recently burned landscapes is short-lived and modest and visitor satisfaction is largely unchanged (e.g., Brown et al. 2008, Love and Watson 1992). Using traditional on the ground counting and visitor surveys and novel crowd-sourced approaches incorporating visitor contributed content to social media platforms, we measured recreation use before and after wildfire in the Columbia River Gorge of Oregon, USA and found only limited visitation changes post wildfire. Our findings of limited change in recreation use post-wildfire is consistent with the findings with those studying other post-fire landscapes in-situ. However, at our study site where we employed traditional methods, we found evidence that the presence of active wildfire or smoke (as opposed to the presence of a burned landscapes) was influencing where and when visitors recreated (White et al. 2020). Following on that research, we used on-the-ground counts of visitors at trails outside Seattle, WA, to explore whether recreation behavior was reduced during a widespread smoke event that significantly reduced air quality in the US Pacific Northwest in 2020. Across our set of study trails, we found marked reductions in trail use during an extended smoky period in September 2020. More interestingly, perhaps, we found that losses in recreation traffic during the smoky September days was recouped in October with above-average recreation traffic during an unusually sunny period, after the traditional recreation season. Our preliminary findings suggest that the presence of smoke may have a more pronounced influence on recreation use patterns than burned landscapes and that presence of smoke during traditional recreation seasons can lead to increased recreation use in shoulder recreation seasons. Our findings of a strong negative reaction by people to wildfire smoke is consistent with the the finding of other recent research completed in the context of increasingly severe wildfire seasons in the U.S. West (e.g., Sachdeva et al. 2017). Our findings further highlight the need to improve our understanding of the complex relationships between wildfire, smoke, and recreation visitor behavior.

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# 119 Nature-based tourism and renewable energy infrastructure: tourism industry's perceptions of the impact area of power plants on tourism

**Edita Tverijonaite[1]**, **Anna Dóra Sæþórsdóttir[1]**, **Rannveig Ólafsdóttir[1]**, **C. Michael Hall[2,3,4]**, [1]University of Iceland, Iceland. [2]University of Canterbury, New Zealand. [3]Lund University, Sweden. [4]University of Oulu, Finland

Due to its reliance on natural landscapes nature-based tourism is sensitive to other land uses which lead to landscape changes, such as renewable energy harnessing. For identification of locations most suitable for renewable energy infrastructure knowledge regarding the spatial extent of the impacts of such infrastructure on nature-based tourism is highly needed.

Estimating the impact area of renewable energy infrastructure on nature-based tourism is, however, challenging. Besides taking into consideration the characteristics of the energy infrastructure and of the surrounding landscapes it is important to investigate how power plants change the meanings assigned to the areas by various tourism stakeholders. Moreover, natural areas used for tourism can be defined as places which are constructed via numerous relations and processes going on within these areas and in larger networks (Massey, 2005; Urry & Larsen, 2011). Therefore, it should be taken into consideration how renewable energy infrastructure affects surrounding areas as elements of tourism systems (Leiper, 1979, 1990).

This study focuses on the views of the tourism industry in Iceland and aims to i) map the impact area of renewable energy infrastructure on tourism as perceived by the tourism industry; and ii) investigate the factors affecting the size and shape of the perceived impact area. To achieve these aims 49 semi-structured interviews were conducted with the managers of the tourism companies operating near six existing and proposed hydro-, geothermal and wind power projects situated within or at the border of the Icelandic Central Highlands. This area is an important venue for nature-based tourism as well as of high interest for further energy infrastructure development due to abundance of renewable resources. During the interviews, participants were asked to map their perceived impact areas of renewable energy infrastructure on tourism using participatory mapping software and, among other topics, to discuss the reasoning behind their estimated impact areas.

The results of the study revealed three main trends behind the reasoning used by the participants while estimating the impact areas: i) visibility of renewable energy infrastructure and of its environmental impacts, ii) tourist mobility, and iii) changes in tourist movement, travel patterns and consequently in other tourism processes. Thus, while according to some participants the impacts of power plants on tourism end with visibility of the energy infrastructure and environmental impacts related to it, others stated that the impacts on tourism extend far beyond the visibility. Participants who based their impact areas on tourist mobility took into consideration routes and destinations used by tourists where visitor experience, their perception and image of the area is affected due to traveling passed the renewable energy infrastructure. Participants who based their estimated impact areas on changes in tourism, took into consideration, for example, avoidance of certain areas due to decreased attractiveness, shorter stay in the estimated area, lower demand for tourism services and consequent economic impacts, as well as increased tourist flows due to construction of roads and bridges for the energy projects, which opens up new areas for tourism and allows inclusion of the Central Highlands destinations into larger itineraries. This stresses the importance of the interrelationships of the areas surrounding energy projects with other destinations and other elements of the tourism systems for the perceived spatial extent of the impacts of renewable energy infrastructure on tourism.

The results furthermore revealed significant differences in the character of the perceived impacts of renewable energy infrastructure on tourism. The participants were more negative towards the proposed power plants and majority of them estimated negative impact areas of the proposed renewable energy infrastructure on tourism, while the impacts of existing energy projects were most often

perceived as positive or mixed/neutral. Such findings are in line with previous studies showing higher acceptance of existing energy projects among tourists compared to the proposed ones (Brudermann et al., 2019; Sæþórsdóttir & Hall, 2018; Sæþórsdóttir & Ólafsdóttir, 2020). According to Brudermann et al. (2019), this can be due to status quo bias (Samuelson & Zeckhauser, 1988), or people's preference of current state over change. Moreover, participants perceived wilderness areas, which are an important resource for the tourism industry, as less suitable for energy development compared to already developed areas.

This study points to the importance of tourism stakeholder inclusion while planning renewable energy infrastructure developments in areas which are of high value for tourism. Inclusion of tourism stakeholder knowledge and perceptions allows identification of potential conflict areas and is likely to lead to higher acceptance of renewable energy projects.

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# 90 Exposure, meanings and landscape-technology fit. A hierarchical analysis of people's preferences towards landscape related energy scenarios and what they are based on

**Boris Salak**[1], **Felix Kienast**[1], **Kreg Lindberg**[2], **Marcel Hunziker**[1], [1]Swiss Federal Institute for Forest, Snow and Landscape Research WSL, Switzerland. [2]Orgeon State University, USA

In response to the effects of climate change, many countries are realigning their energy systems to the principle of sustainability. An energy system change will lead to the development of substantial renewable energy infrastructure (mostly wind and photovoltaic) in landscapes with effects on perceived landscape quality and socio- political acceptance. Both direct perceptive effects of physical landscape structures and latent meanings associated with those structures potentially affect their acceptance.

Until now it is mostly unclear how these effects affect people's decision making. Recently discussions arose regarding the importance of individual concepts supporting interpretation and weighting of already existing knowledge and experience before decision making. This work evaluates the role of landscape-technology fit (Salak et al. 2021) (derived from place- technology fit (Devine-Wright 2009; McLachlan 2009)) representing the extent to which alternatives within each of these two components "fit" together (e.g., does a given type of renewable energy infrastructure fit well within some landscapes but not others?). It also evaluates the role latent meanings ascribed to landscapes and renewable energy infrastructure within that mentioned "fit" decision as well as the role of prior experience (exposure) to both.

The study is based on a survey of Swiss citizens in a representative online panel (n=1062). To estimate preferences for diverse renewable energy infrastructure scenarios across landscape types, a discrete choice model was implemented. Meanings ascribed to landscapes and renewable energy infrastructure were included in a second component of the survey. Usually, latent and observed variables are analyzed independently which leads to potential lack of information especially regarding their interoperability. To avoid this, an innovative hybrid choice model approach facilitated integration of latent and observed variables in a hierarchy of predictors.

As results show that most effects were statistically significant the hybrid choice model enhances understanding of landscape transformation preferences. It retrieves that Landscape-technology fit functioned as a moderator between choice attributes and preferences and can therefore be seen as a moderator of public preferences across energy scenarios. Meanings ascribes to both landscapes and renewable energies predict landscape-technology fit and are predicted by relevant prior experience (landscape/renewable energy exposure). Also, it can be seen that renewable energy in natural landscapes triggers passive place-protective behavior.

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# 158 Climate change and the demand for recreational ecosystem services on public lands in the United States

**Emily J. Wilkins[1,2]**, **Yoshimitsu Chikamoto[3]**, **Anna B. Miller[1,2]**, **Jordan W. Smith[1,2]**, [1]Institute of Outdoor Recreation and Tourism, Utah State University, USA. [2]Department of Environment and Society, Utah State University, USA. [3]Department of Plants, Soils and Climate, Utah State University, USA

**Introduction**

Cultural ecosystem services represent nonmaterial benefits people derive from the environment; these benefits include outdoor recreation opportunities (Millennium Ecosystem Assessment, 2005). Changes in climatic conditions are likely to shift the spatial and temporal demand for recreational ecosystem services. Climate change has already expanded the length of the peak visitation season for some public lands (Buckley & Foushee, 2012; Monahan et al., 2016), and is expected to change total visitation at nearly all U.S. National Parks (Fisichelli et al., 2015). However, the effects of climate change on visitation to public lands may vary by season, the location of the public land unit (Hewer & Gough, 2018), and its unique microclimatic conditions (Smith et al., 2018; Wilkins et al., 2021). To date, little is known about the magnitude and spatial variability in these shifts across large geographic extents. Here, our goal is to explore how the seasonal demand for recreational ecosystem services may change across U.S. public lands in the future under different climate change scenarios. Understanding potential future shifts in demand can help land managers plan and prepare for possible regional or seasonal shifts in visitation trends.

**Methods**

We used 14 years of geotagged social media data to explore how average seasonal maximum temperatures affect the demand for recreational ecosystem services by season across all state and federal public lands in the continental United States. We used Flickr posts, a measure of direct use, to represent the demand for recreational ecosystem services, only counting one photograph per user, per day, per 30 km grid cell (photo-user-days). We ran negative binomial regression models to understand the impact of average maximum temperature on the demand for recreational ecosystem services, while controlling for other variables (e.g., local population, km of roads). We ran separate models across ten different U.S. regions, and for all four seasons. We used the incidence rate ratios from the models to project how the seasonal demand for recreational ecosystem services on public lands may change by 2050 under two different climate change scenarios, RCP 4.5 and RCP 8.5.

**Results**

Overall, the demand for recreational ecosystem services on U.S. public lands is highest in the summer. Demand in the summer months spanning June, July, and August, was double that observed during winter months (December, January, and February). Results indicate that the demand for recreational ecosystem services across U.S. public lands is higher in warmer areas in the winter and spring, but lower in warmer areas in the summer. Across all public lands in the continental U.S., demand in the summer is expected to decrease 18% by 2050 under RCP 4.5, or 28% under RCP 8.5. However, our results project an increase in demand by 12% under RCP 4.5 in the winter, and a 20% increase under RCP 8.5. We expect a 5% increase in demand in the spring by 2050 under RCP 4.5, and 9% under RCP 8.5, with no significant changes in the fall.

There is substantial variation in the magnitude of projected changes by region. In the spring and fall, some regions are likely to see an increase in demand for recreational ecosystem services, while others will see declines (Figure 1). These findings indicate that across the entire U.S., demand for recreational ecosystem services is expected to decline under climate change scenarios, but with large shifts in the demand across seasons and regions. The peak season for visiting public lands is likely to lengthen in the U.S. as the climate continues to warm, with fewer visitors in the summer, but more in the off-season.

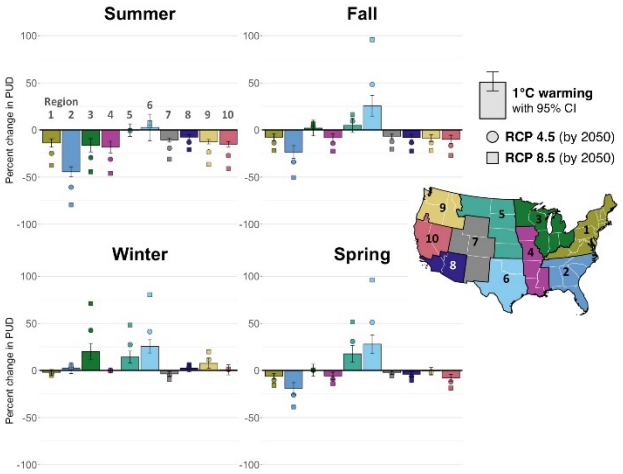


***Figure 2.*** *Projected changes in photo-user-days (PUDs) by region under different levels of warming. Bars and standard errors are directly from the negative binomial model results; if error bars cross zero, the change is not statistically significant at α = 0.05. Point estimates represent extrapolations of model results out to 2050, based on the projected temperature anomalies under RCP 4.5 and 8.5.*

## Discussion

This study shows that average temperature has an impact on the demand for recreational ecosystem services across U.S. public lands, and that demand is likely to shift temporally (across seasons) and spatially (across regions) as the climate warms. In many locations, land managers may want to consider preparing for an increased peak season length, and more visitors in the winter compared to past levels, but fewer in the summer. An expanding peak-season may require that more visitor services are needed in the off-season. For instance, parks and protected areas may want to keep visitors centers, bathrooms, and campgrounds open for longer periods of time to accommodate the rising number of visitors. Future research is still needed to explore how indirect climate change effects, such as shifting seasonal blooms or wildlife distributions, may affect the demand for recreational ecosystem services across public lands.

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# Recreation and tourism impact on landscape and wildlife

| SESSION | PART | DATE | TIME | CHAIRS |
|---|---|---|---|---|
| 7C | I | Thursday 19th August | 12.00 – 13.20 CET | Sofie Selvaag |
| 8C | II | Thursday 19th August | 13.30 – 14.50 CET | Sofie Selvaag |

| | Programme |
|---|---|
| *7C* | **182** Understanding the impacts of road and aircraft noise on avian species richness in Milford Sound, Fiordland National Park, New Zealand: A proposed methodology |
| | **145** Nature-based sports events and natural and protected areas in Portugal. A geographic mapping approach |
| | **150** Effects of mountain biking versus hiking on trails under different environmental conditions |
| *8C* | **126** Development of vegetation and soil impacts on trails and campsites in a Norwegian National Park during 30 years: Worse or better? |
| | **69** Monitoring soil erosion on campsites by structure-from-motion photogrammetry: A case study of the current and former Kuro-Dake Campsite in Daisetsuzan National Park, Japan |
| | **78** Monitoring and predicting trail erosion in Daisestuzan National Park in Japan |

# 182 Understanding the impacts of road and aircraft noise on avian species richness in Milford Sound, Fiordland National Park, New Zealand: A proposed methodology

**Samantha Fulton**, **Brian Donohue**, **John Pearse**, University of Canterbury, New Zealand

**Background**

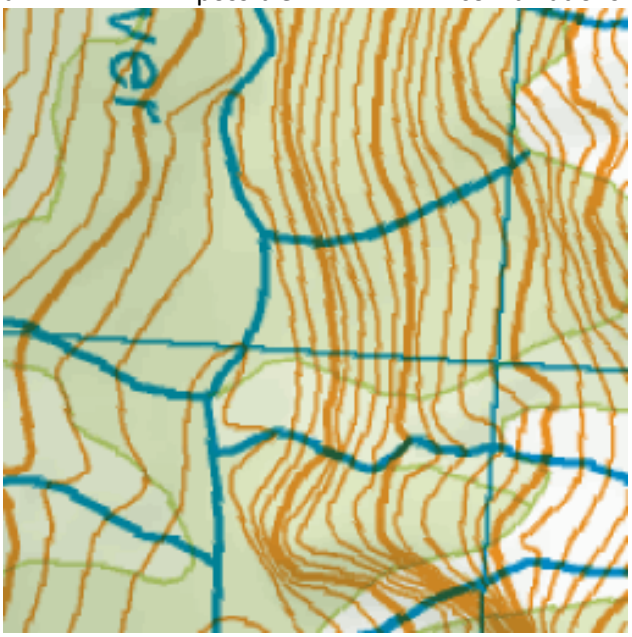
Milford Sound is a tourism hotspot located in the protected natural area of Fiordland National Park, New Zealand. Due to its wild landscape, unique views and natural quietness, it is considered one of New Zealand's must visit locations for tourists, both national and international. Consequently it received nearly 1 million visitors annually pre-Covid, which is of concern because a number of international studies have shown a link between high visitor numbers and degradation of natural soundscapes. Due to the extreme topography of the park, Milford is quite isolated and only accessible by aircraft and a single road; the Milford Highway. These modes of transport generate a disturbance, not only along the highway corridor, but spatially more expansive due to the nature of aircraft and traffic noise propagation - exacerbated by the topography. Whilst effects of these noise sources on human perceived tranquillity in New Zealand have been and are currently being investigated, no such research has focussed on the impacts to wildlife in this context. Similar studies have been conducted internationally, such as in the United States, that conclude anthropogenic noise has detrimental effects on avian wildlife, such as communication, use of space, reduced reproductive success, and altered species richness. Further to this body of work, our research will focus on the impacts of such noise sources on avian species richness in the New Zealand context, which has been identified as a research gap. This research is imperative due to the unique ecology of New Zealand for which more than 70% of bird and animal species are endemic.

**Method**

Our proposed research will partly follow Sordello et al.'s (2020) systematic map that identifies a number of relevant research papers that will help guide our literature review and research methodology. From here we will establish three research questions that address the overarching aim, such as:

1. What is the spatial extent of anthropogenic noise in and around Milford Sound? With focus on road traffic, aircraft and watercraft noise.
2. Is there an efficient method for autonomous collection of sound recordings for quantification and identification of bird species and the selected anthropogenic noise sources?
3. Is indigenous bird species richness degraded by anthropogenic noise?

In order to obtain answers to these questions it will be necessary to carry out fieldwork in Milford Sound during which collection of sound recordings of the anthropogenic noise sources and bird vocalisations will take place. Firstly, we hope to record aircraft noise, traffic noise and watercraft noise using Wildlife Acoustics Inc.'s type 4 Song Meters. This data will then be mapped using a program such as Noise Model Simulation (NMSim) or NMSim GIS - which is part of the Sound Mapping Tools ArcGIS toolbox. Resultant maps will be used to create a visual representation of each noise source's spatial extent, potentially both individually and cumulatively considering all possible combinations.



To address question two we are developing autonomous acoustic data-logging stations based on the type 4 Song Meters. These will be deployed as arrays in areas where the Department of

Conservation (DoC) has collected data on vegetation and avian species present -referred to as Tier-1 data. Tier-1 data consists of acoustic and observational recording of birds present, along with detailed data on vegetation and invasive animal species. Data was first collected in late 2011 and each year a random sample of 260 sites are measured resulting in each site being recorded once every five years. The acoustic data is from five microphones, one located at the centre of a 20 meter square vegetation plot with the other four located at the end of 200m transect lines each extending out diagonally at 45°. These sample plots are roughly 8km apart and there are about 1350 of them throughout New Zealand (Department of Conservation). We will review the DoC Tier-1 data available on avian species richness for Milford Sound for comparison with our own field study results

At this stage we are unsure as to whether analysis software will need to be developed to recognise anthropogenic noise or whether existing bird-call recognition software, that has machine learning capability, can be 'taught' to recognise anthropogenic sounds that include noise from aircraft, traffic and watercraft. We may also need to identify the sound of other human activity, such as walkers and our own team setting up the equipment in order to disregard these noise sources from our analysis.

Lastly, to address question three, an experimental study is likely necessary in order to draw any decisive conclusions about a cause-and-effect relationship. This will involve playing recordings of the anthropogenic noise sources and then recording the results with our acoustic array. Our study will also include comparisons with a control site in a similar but more remote location where there is no detectable anthropogenic sound. The objective of this review will be to identify any links between the incidence of anthropogenic noise and species richness, ranking contributing noise sources. Determining suitable metrics for analysis of the various sounds as well as defining limits and exposure times will be part of the study.

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# 145 Nature-based sports events and natural and protected areas in Portugal. A geographic mapping approach

**Ricardo M. Nogueira Mendes[1,2], Estela Farías-Torbidoni[2], Carlos Pereira da Silva[1], Rui Pedro Julião[1],**
[1]CICS.NOVA, NOVA FCSH, Lisboa, Portugal. [2]GISEAFE, INEFC-UdL, Lleida, Spain

Natural & Protected Areas (N&PA) have always promoted visitation and leisure uses of its territories, but these have changed dramatically over the last few decades. Soft and contemplative activities like walking, hiking, or camping have moved to hard skill/adventure practices such as trail running (TR), mountain biking (MTB), among others carrying new challenges to these territories. The urbanization/globalization of the world population have for sure played some role in these new practices, where N&PA are used at the same time as an escape from modern ways of life reconnecting people to the environment/wild, but also attracting urban lifestyles, usually foreseen as new opportunities for local and regional development making balance between positive and negative impacts difficult to measure and monitor. Large nature-based sports events of MTB and more recently of TR are two of these new uses that can gather up to thousands of practitioners and visitors over several days depending on different factors. Although "natural/rural" landscapes and positive climbs are not exclusive of N&PA it's not uncommon that these concentrate the most appellative territories for these nature-based activities. Previous studies on MTB have found that these events tend to happen in Portugal more close to N&PA (Nogueira Mendes, Farías-Torbidoni & Pereira da Silva, 2021) and that within Lisbon Metropolitan Area, 60% of MTB rides target at least one of its peri-urban N&PA – that altogether occupy only 10% of the territory (Nogueira Mendes, Farías-Torbidoni & Pereira da Silva [submitted]). Julião, Valente & Nogueira Mendes (2018) found that 30% of the actual trail runners are old mountain bikers, suggesting that MTB is being gradually replaced by TR in terms of popularity. What could be a pressure relief in terms of environmental and social impacts from MTB, could be a new wave of concerns to N&PA managers, since TR is bringing not just older but also new users and different demands.

To better understand the role of N&PA on MTB and TR events organized in Portugal, the location of all these nature-based sports events promoted in 2018 was plotted against the National Network of Classified Areas (SNAC), to evaluate its attractiveness and possible susceptibility. SNAC includes the National Network of Protected Areas (RNAP), Natura 2000 Network sites, Ramsar sites, and UNESCO Biosphere Reserves, covering a total of 29,58% of the country area that follows under the jurisdiction of the National Institute of Nature Conservation and Forestry in terms of recreational and sports use. Although both MTB and TR are sports activities, many events fall off the jurisdiction of its sports federations and their official calendars, requiring secondary data to monitor it at the national level. Data was gathered from Timing companies - often hired to manage registrations and insurances, along with national & regional federations/associations, social media, municipalities, and local cultural and sports clubs' webpages. Extra searches were conducted within the WWW during February 2019 using the terms: "MTB", "TR" and "2018". Results have found 608 MTB and 461 TR events scattered all over Portugal mainland, that were georeferenced and uploaded to a GIS project (Figure 1). Proximity to all protected and classified areas was measure using a 10 km search radius since most MTB and TR events have several race lengths.

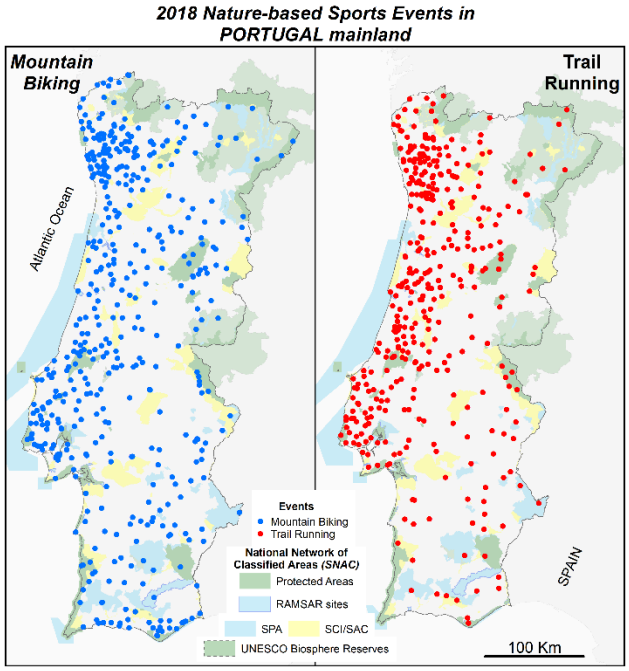


*Figure 1 - 2018 Nature-based sports events in PORTUGAL mainland.*

The GIS analysis revealed that 78% of MTB and 72% of the TR events were within the immediate proximity of a SNAC area revealing that these territories appear to attract nature-based sports events. The major contribution to these results is provided by Natura 2000 sites and RNAP that cover 21,11% and 8,26% of Portugal mainland respectively. By itself, these might not threaten biodiversity or nature conservation, especially in areas where management plans exist and are actively undertaken, but surveillance and monitoring should always be taken care of especially when several events happen too close to each other within the same natural or protected area. Previous studies done on MTB use around protected areas in the country suggest that most participants of these events tend to be residents that use the surrounding areas all year round – meaning that these events by themselves do not represent much more use than what is made by regular bikers (Nogueira Mendes & Pereira da Silva, 2016). But with TR, and comparing to what is known about MTB practitioners, surveys suggest that these tend to move more and to stay over, taking their partners or family what could represent a positive economic impact to the region (Valente, 2019). Otherwise to MTB events nowadays, TR events have more "outsiders" and more participants.

The real impacts of nature-based sports events should consider other aspects besides this simple geographical approach, but this can be a start point for other studies at regional and national scales. Nevertheless, this study has shown that N&PA plays an important role in hard skill and adventure sporting events in Portugal, and impacts and effects on the environment and local communities can spread much wider and longer than the event itself. As said, these are physically demanding activities, requiring regular practice to accomplish results and personal goals – and it seems like the best places in Portugal to take part in these activities are N&PA).

Acknowledgments

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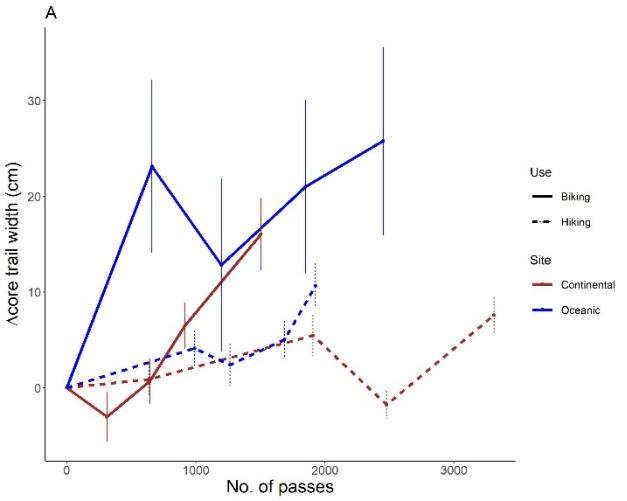
# 150 Effects of mountain biking versus hiking on trails under different environmental conditions

**Marianne Evju**, **Dagmar Hagen**, **Mari Jokerud**, **Siri Lie Olsen**, **Sofie Kjendlie Selvaag**, **Odd Inge Vistad**, Norwegian Institute for Nature Research, Norway

Recreational use of nature areas is increasing worldwide. All trail-based activities have a certain degradation effect on vegetation and soil, and conflicts between conservation values and recreation may occur. Controversy still exists regarding the relative impact of mountain bikers compared to hikers on trails. In Norway, mountain biking is allowed on existing, multiuse trails outside of protected areas, but within protected areas restrictions vary, whereas hiking is allowed. A governmental proposal suggests to allow for mountain biking on trails in national parks in line with hiking, but restrictions could be introduced if effects from biking are more severe than from hiking and in conflict with conservation values. For managers, knowledge about the effects of opening trails for new user groups in national parks is highly needed: will mountain biking cause other and more severe effects on trails, and thus provoke higher and other trail maintenance needs, or are effects similar to that if hikers?

In this study, we investigated trail degradation from increased use of trails from hikers and ountain bikers under different climatic conditions. Two study sites were selected, one located in an oceanic climate zone and the other in a continental zone. In each site, two trails were selected, one to be predominantly used by hikers and one by mountain bikers. The trails were natural-surfaced, occurring in natural vegetation, and with a variation in topography and plant communities. We contacted local groups through different channels (personal contact, e-mails, announcements on Facebook groups) and encouraged the use of the study trails throughout the summer of 2019. Mountain bikers were informed of the designated biking trails only, and we created Strava segments that were distributed to bikers. The oceanic biking trail was used for a local Endoru race from May-August, whereas the continental trail was part of a mountain bike race in end-August. Hikers were informed of the designated hiking trails only, and we mounted information signs in each end of the trails encouraging people to take a detour. Passes were counted with TRAFx counters.




We permanently marked sampling segments every 100 m along the trails. A sampling segment was a 15 m long part of the trail with homogenous vegetation and terrain. Three transects were placed perpendicular to the trail, at 2.5, 7.5 and 12.5 m from the segment starting point, with transect end points located in undisturbed vegetation. Trail width (core trail, and total trail width including the width of the transition zones between core trail and undisturbed vegetation, where signs of trampling were visible) and depth were recorded at early in the growing season (April-May), and then repeatedly approximately every fourth weeks to the end August-September. Environmental conditions were recorded at each sampling point (trail slope alignment) or transect (dominant soil substrate, soil moisture, trail slope). In total, our dataset included 1305 observations of 261 transects on 87 segments. We analyzed data with linear mixed models, using change in trail width and trail depth from the first sampling time as response variables, as a function of number of passes, proportion of bikers and environmental conditions along the trail.

Use intensity increased through the season, but varied between the trails: the continental hiking trail had the highest use (c. 3300 passes), whereas

the continental biking trail had the lowest use (c. 1500 passes). The study design was successful in directing bikers to the designated biking trails: On the biking trails, the proportion of bikers averaged 47.3% (± 8.6SD), whereas on hiking trails, the proportion was on average 13.2% (± 2.4 %).

Trail width, both the core trail without vegetation and the total area influenced by trampling and biking, showed on average small, but highly variable increases with enhanced use (figure 1). The most parsimonious models for core trail width change showed an increase in core trail width with increasing use, and a significant positive interaction between use intensity and proportion of bikers; core trail width increased more with increased use when the proportion of bikers was high. The most important predictor variable was soil moisture, core trail increased more in wet parts of the trail. Significant two-way interactions between soil moisture and both the proportion of bikers and use intensity revealed that core trail width increased particularly in wet parts of the trail with increased use and when a large proportion of users were bikers. The same pattern was found for total trail width. Trail depth did not change much throughout the study period, suggesting that the soils along the trails were already compacted and to a limited degree prone to soil movement and subsequent soil loss.

Our study is a necessary supplement to existing literature, as the first study to compare relative effects of mountain biking and hiking on natural-surfaced trails throughout a whole growing season, accounting for the number of passes by each user type. At the start of the study, trails were wider in moist and flat compared to dry and steep parts. Our study shows that on-trail use by hikers and mountain bikers had relatively limited overall effects in terms of trail widening and deepening. However, that effects depend highly on environmental conditions; we found soil moisture to be the most important predictor for trail widening. Enhanced use of trails in wet areas is likely to result in greater trail degradation, and more so if a large proportion of the users are mountain bikers. Management and maintenance of trails, in terms of re-routing or trail surface hardening, could thus be necessary to avoid negative impacts of increased use. For such management actions to be successful, they need to be targeted towards the actual user groups and the natural conditions in the area.

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# 126 Development of vegetation and soil impacts on trails and campsites in a Norwegian National Park during 30 years: Worse or better?

**Valan Sindre[1], Øystein Aas[1], Odd Inge Vistad[2], Marianne Evju[2],** [1]NMBU, Norway. [2]NINA, Norway

**Introduction**

A report from 2006 states that disturbances and impacts on vegetation and soil are the biggest threats to the conservation values in the national parks. In the spring of 2014, the Norwegian Environment Agency's work began on developing a brand strategy for Norway's national parks. By 2020, all of Norway's national parks should have prepared a visitor strategy. In the visit strategy for Femundsmarka National Park, it is a measure to carry out comparative surveys of wear on campsites and trails, which was done in the 1980s. At the end of the 1980s, a major research project was carried out in the protected areas Femundsmarka (N), Rogen (S) and Långfjellet (S) in the so-called FRL-project. A part of the study was to register impacts on vegeation and soil at campsites.

The purpose of this Master thesis is to map impacts on vegetation and soil and assess changes over time, caused by visitors in Femundsmarka National Park. Both in areas previously investigated and in other areas with management challenges. A method test of aerial photos was also carried out to register campsites. Based on secondary data an assessment of traffic development was done.

**Study area**

Femundsmarka National Park was established in 1971 with a protected area of 345 km$^2$, and expanded in 2003 to 573 km$^2$. Data were collected from three study areas in the national park, by Røsanden, along Røa and on Røvolfjellet. The study area at Røsanden is 2.4 km long and runs along the beach zone both north and south of the outlet of Røa Lake, by Femunden. Røsanden is a flat area dominated by rocks, sand and gravel in the sediments. Blueberry forest and heather forest are dominant vegetation types. The study area along the south side of Røa is 6.2 km long and starts at Starrhåen and ends at Nedre Roasten. The terrain along the watercourse is hilly with large areas of block land. Dominant vegetation types are blueberry forest, heather forest and oligotrophic bogs. The study area at Røvolfjellet includes Røvoltjønnan and the surrounding areas and comprises an area of approx. 1.3 km$^2$. The terrain is somewhat hilly with moraine sediments. Dominant vegetation types are heaths of heather and lichen.

**Methods**

Registrations of impacts on vegetation and soil on campsites followed the same methods as Vistad (1995) used during his fieldwork in 1988. Vegetation-free areas, condition class, number of firepits and damaged trees. In addition, development of impacts was added as a new indicator. It will tell if the impacts at the campsite is increasing or decreasing. A more detailed registration of damage to trees at campsites was also made. A random sample of trees at each campsite had the type of damage and age of damage examined.

Impacts on vegetation and soil along the trail from Røsanden to Røvollen was measured at an observation point per 200 m. The selection of an observation point was made with a semi-random outlay. At each observation point, trail width (core trail, transition zones and total), trail depth, wear condition, slope and substrate type were measured.

**Results**

The number of actual campsites not visible on aerial photos, was higher than the number of beforehand estimated campsites which turned out not to exist in reality. There was thus an underestimation of the number of campsites when using aerial photos. The number of visitors to Femundsmarka in the last 30 years may have increased, but it is difficult to know exactly how these numbers have developed. Since 1988, the number of campsites has increased both at Røsanden and along Røa with resp. 19% and 70%. Between 1988 and 2020 vegetation-free areas increased by 13% at Røsanden and 78% at Røa. Only one of the studied areas has had a declining wear development. The main reason for this development is that the area is not as accessible as before. The

**Table.** Development in number of campsites, vegetation-free areas, condition classes, number of firepits and damaged trees on campsites at Røsanden and along Røa from 1988 and 2020. ** Significance at 0.01 level, *** Significance at 0.001 level.

| | **Campsites** | | **Vegetation-free areas ($m^2$)** | | | | **Condition classes** | | **Firepits** | | **Damaged trees** | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Total | | Total | | Mean (mean in c.class 3 and 4) | | Mean | | Total | | Total | |
| | Røsanden | Røa | Røsanden | Røa | Røsanden | Røa | Røsanden | Røa | Røsanden | Røa | Røsanden | Røa |
| **1988** | 21 | 10 | 655 | 246 | 31 (60) | 25 (17) | 2,9 | 2,9 | 52 | 33 | 112 | 8 |
| **2020** | 25 | 17 | 738 | 438 | 30 (33) | 26 (26) | 3,2** | 3,6** | 29*** | 25*** | 241 | 163 |

number of damaged trees in 2020 has increased from 112 to 241 at Røsanden and from 8 to 163 along Røa compared with 1988 (see table). Along the current path between Røsanden and Røvollen, the average total width was 223 cm and average depth was 11 cm. All points were considered to have an increased amount of impacts. There is very little traffic along the rerouted path, and the total width was decreasing at all measured points.

**Discussion**

The optimal measure to solve a management challenge is the one that minimizes visitors' impact on the natural environment the most and at the same time reduces the quality of the recreational experience the least. Several repairing and preventive measures have been proposed, which, among other things, are linked to information and channeling of traffic to where it is desired. To prevent damage to trees, measures such as transporting firewood to widely used campsites, banning campfires outside facilitated campsites and removing stumps / branches from damaged trees. A physical environment that is in a bad state will be able to trigger bad behavior. An area that is well cared for and looks good will most likely provide positive experiences for the visitor, leading to a positive behavior.

First-time visitors to Femundsmarka on multi-day trips, often with certain perceptions of what they want, are more difficult to control compared with first-time visitors on "random" day trips in e.g. Jostedalsbreen. This means that Femundsmarka has special challenges in also managing first-time visitors. Both first-time visitors and experienced users in Femundsmarka may need to be managed with more direct management measures (prohibition / injunction). Prohibition of traffic is to a very small extent used in Norwegian national parks, and with the political objective of increased use of the national parks, it is difficult to envisage management methods that seek to ban traditional use of an area.

In cases where conservation values are threatened, both central authorities and the individual national park board must raise the discussion about using stricter and regulatory measures if undesirable impacts that damage the conservation values should be reduced or avoided. The resource situation must be adapted to the challenges at hand.

# 69 Monitoring soil erosion on campsites by structure-from-motion photogrammetry: A case study of the current and former Kuro-Dake Campsite in Daisetsuzan National Park, Japan

**Ting Wang**[1], **Teiji Watanabe**[2], [1]Graduate School of Environmental Science, Hokkaido University, Japan. [2]Faculty of Environmental Earth Science, Hokkaido University, Japan

## Introduction

Camping is one of the popular recreational activities in mountain national parks. However, human activities inevitably cause impacts on natural resources, which includes vegetation loss, soil compaction and soil erosion (Hammitt and Cole 1998). The degraded environment also does harm to users' experiences in return (Daniels and Marion 2006). In order to provide users with high quality camping experiences meanwhile avoid unacceptable impacts on the natural environment, monitoring and maintenance of campsites are necessary.

Researchers in the field of recreation ecology have provided a sort of methods to monitor short-term and long-term changes in the condition of campsites. Methods to detect areal changes in bare ground and vegetation loss on campsites have been widely practiced in previous studies (Marion 1991, Wang and Watanabe 2019). Eagleston and Marion (2017) examined soil loss on campsites by comparing the current soil level around embedded rocks on site with the one recorded in past photographs through visual observation. Wang and Watanabe (2019) adopted Structure-from-Motion (SfM) photogrammetry mapping to obtain detailed profiles of the ground surface on the campsite where gully erosion was observed. However, no studies have been conducted to monitor the volumetric changes in ground surface on campsites that are suffering from soil erosion.

This study aims to detect topographic changes of the ground surface and to quantify the volume of soil erosion on the current and former Kuro-dake campsites in the Daisetsuzan National Park (DNP) by SfM photogrammetry surveys.

## Study area

DNP, located in the center of Hokkaido, is the largest national park in Japan. There are 12 unmanaged campsites in DNP and most of them are situated in a fragile alpine setting surrounded by dwarf pinus pumila and other alpine flora. The camping season starts from the end of June and ends in the end of September. During the off-season period, these campsites are covered by thick snow for a half year. Occasional heavy precipitation and continuous supply of snowmelt water in summer have caused serious soil erosion on both trails and campsites. The current and former Kuro-dake campsite are the representative campsites suffering from serious soil erosion. Without formal management and maintenance, the soil erosion on the former Kuro-dake campsite had become more and more serious and some deep gullies emerged across the campsite. As a result, it was closed in 1991. The current Kuro-dake campsite was opened in the next year. After the constant use without maintenance, gully erosion has also been observed on the current site.

## Methods

SfM photogrammetry surveys with Ground Control Points (GCPs) were conducted on the current Kuro-dake campsite (in 2017, 2018 and 2019) and on the former Kuro-dake campsite (in 2018, 2019 and 2020). The photographs of the campsites were taken by UAV/pole photogrammetry. For each campsite, three sets of topographic maps were created for the current and former campsites by using the location data of the GCPs which were recorded with a global navigation satellite system receiver (Trimble Geo 7X) on site, respectively (resolution: 1.5 cm and 2.5 cm, respectively). The mappings were completed in Metashape software. Then 3D analysis was conducted in ArcMap 10.8.1 with the topographic maps of different years to identify the elevation changes and to calculate the volumetric changes in ground surface. A minimum level of detection (minLoD) with a 95% confidential interval was used to filter out uncertain elevation changes.

## Results and Discussion

### Soil erosion on the current Kuro-dake campsite

From 2017 to 2018, vertical erosion of more than 5 cm deep was identified around the gully on the current campsite. The maximum vertical erosion exceeded 15 cm deep at the terminus of the gully (Figure 1a). The volume of soil erosion from 2017 to 2018 was about 2.52 $m^3$. The gully had remained stable without any elevational changes from 2018 to 2019: the volume of soil erosion was only 0.67 $m^3$. During the study periods, the average annual use level of the current campsite was around 1158 persons/year. The precipitation data provided by the nearest meteorological station (Sounkyo; 540 m in altitude) show remarkably heavy daily rainfall (116.0 mm) on third July 2018, which may explain the significant soil erosion in 2017-2018. The erosion rate varied during the short study periods, suggesting that long-term monitoring is necessary.

### Soil erosion on the former Kuro-dake campsite

From 2018 to 2019, both erosion and deposition were identified on the former campsite. The net volumetric change in the ground surface was -1.55 $m^3$ showing a little amount of soil loss. From 2019 to 2020, erosion had been dominated, which occurred mainly around the gullies. The maximum vertical erosion attained 20 to 30 cm deep (Figure 1b). The volume of soil erosion was 22.67 $m^3$. Although the development of the soil erosion on the former campsite did not show consistent speed during the two study periods, the trend is clear: soil loss around the gullies is still continuing after the long-term closure. Meanwhile, in order to verify the influence of precipitation on erosion rate there is a need to collect in-situ precipitation data.

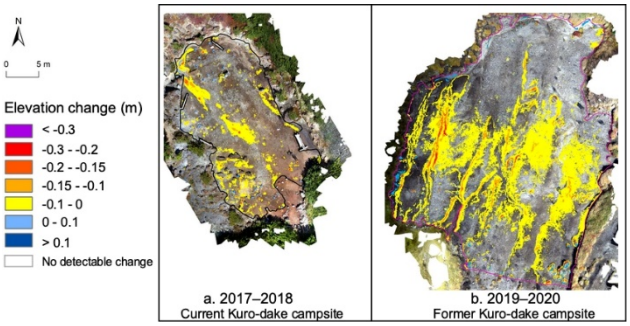


*Figure 1. a) DEMs of difference of the current Kuro-dake campsite, from 2017 to 2018 (ortho image of 2018); and b) DEMs of difference of the former Kuro-dake campsite, from 2019 to 2020 (ortho image of 2020).*

## Conclusions

The monitoring of soil erosion with SfM photogrammetry will provide a better understanding of trends of campsite degradation for national park managers, which is important for future decision-making regarding campsite management and maintenance. Efforts should be taken in stopping/mitigating soil erosion on both the current and former Kuro-dake campsite. Burying the gullies with boulders and setting up boulders or wooden fence at the terminus of the gullies can be one of the solutions to stop/mitigate further erosion. For this purpose, formal management should be introduced to the current unmanaged campsites in DNP.

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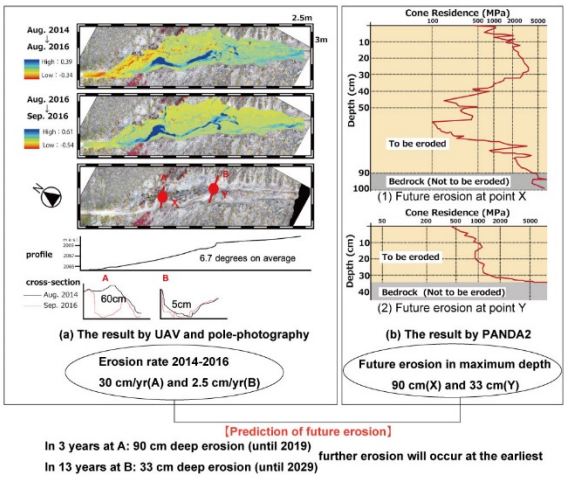
# 78 Monitoring and predicting trail erosion in Daisestuzan National Park in Japan

**Yusuke Kobayashi**, **Teiji Watanabe**, Hokkaido University, Japan

Mountain trail erosion is one of the geomorphological phenomena, which is generally caused by surface water and human trampling. Mountain trail erosion is one of the most serious problems in many national parks of Japan. Such examples are observed on trails in Mt. Rausu-take (Shiretoko National Park), Mt. Rishiri-san (Rishiri Rebun Sarobetsu National Park), Mt. Daisetsuzan (Daisetsuzan National Park), and Mt. Miyanoura-take (Yakushima National Park). Volcanic ashes cover trails in most of these mountains, and snow remains until the time when many trekkers come. For these reasons, trails in these mountains are eroded rapidly and deeply. Therefore, it is important to conduct studies to predict further erosion.




Mountain trail erosion has been traditionally studied by surveying cross-sectional changes at certain sites. The method of surveying cross section can be conducted quickly and simply for park managers to understand changing magnitudes of mountain trail erosion for a long period. In Japan, this method has been used mainly in Daisetsuzan National Park, and numerous data have been already accumulated in some trails. However, magnitudes of mountain trail erosion are understood in just two dimensions by this method. Furthermore, the largest limitation of this method is that the eroded/deposited area is understood only at the measured sites and does not produce the eroded/deposited volume of the entire trail segment with a certain length, which is more important for trail management.

This study, conducted in Daisetsuzan National Park (DNP), Japan's largest national park, has three objectives: (1) to show digital elevation models (DEMs) of the mountain trails including the surrounding ground surface, and to estimate the change of the eroded volume from 2014 to 2021; (2) to predict further erosion in the near future; and (3) to understand a relationship between the trail erosion and the number of trekkers.

DNP is located in central Hokkaido, northern Japan. The total length of the trails in the park is more than 300 km. Statistical data from the Japan's Ministry of the Environment show that the number of visitors to DNP in the 2017 summer attained approximately 97,000.

The investigated trail is located near Mt. Hokkai-dake (2149 m a.s.l.) in DNP. Seven segments with the soil erosion from a starting site to an ending site were selected. The length of the segments varied from 32 m to 195 m. The seven segments are located in the most seriously damaged trail in the entire park. This study employed the use of UAV (often called a drone) and pole photography (a method to take photographs by a camera attached to a long pole) to make digital surface model (DSM) to resolve the above limitation. Before flying UAV or conducting pole photography, ground controlling points (GCPs) were set and precise distance among the GCPs was measured using a total station and Trimble Geo7X.

Depending on the length of the distance of the surveyed trail segments, 300 to 500 photographs were taken in each segment by using UAV and pole photography. For an analysis of the photographs taken by UAV or by pole photography, Agisoft which is one of the Structure from Motion (SfM) software, was used, and DSMs and orthophotographs were made with the photographs. In addition, PANDA2, a soil compaction penetrometer, was employed to estimate the thickness of the unconsolidated volcanic materials from the trail surface to the top of the bedrock to predict the depth to be eroded in the near future at 14 points in each of the seven segments.

The result of the analysis shows that the most eroded volume in one of the segments was

274.67 $m^3$ in 2014, and 282.37 $m^3$ in 2016. This erosion was caused by extremely heavy rain in the 2016 summer.

Figure (a) shows that sites B and A had erosion of 5 cm and 60 cm thick soil from 2014 to 2016. Figure (b) shows that potentially further eroded soil depth will be 90 cm (point X = site A) and 33 cm (point Y = site B). If any measures against trail erosion will not be taken, such further erosion will potentially occur at these sites.

Another result obtained is the occurrence of lateral erosion. Running water welled up from the underground was observed on the eroded trail surface in the end of August. The water triggered lateral erosion in August 2017, making a situation to force trekkers to step on the fragile small-scale periglacial landforms with vegetation cover along the designated trail. This suggests that relocation of the trail segments should be taken in consideration to avoid further degradation.

All trekkers are requested to submit a hiking registration at the trailhead in DNP. Counting the number of the hiking registrations, the number of trekkers who hiked on the studied trail was only 2,000 in 2016 although the number of annual visitors in the national park was approximately 300,000 in the same year. However, about a half of 2,000 trekkers were concentrated in September because they came to enjoy fall colors. This result indicates that the number of trekkers is not likely to decide the volume of the trail erosion in the case of the study area.

# Visitor strategy and local community development

| SESSION | PART | DATE | TIME | CHAIRS |
|---|---|---|---|---|
| 7D | I | Thursday 19th August | 12.00 – 13.20 CET | Sofie Selvaag |
| 8D | II | Thursday 19th August | 13.30 – 14.50 CET | Sofie Selvaag |

| | Programme |
|---|---|
| *7D* | **99** Efforts to improve sustainable tourism and environment sustainability: understanding from local people's perspective in Sagarmatha National Park and Buffer Zone, Nepal Himalaya |
| | **123** Where green is greener? Multi-data approach for typology of urban green spaces |
| | **128** Intentional and incidental nature experiences in urban nature |
| | **189** Tradition and destination: Socio-ecological sustainability and the host-visitor interface in second-home development in Norway |
| *8D* | **53** Visitor management as a tool to develop sustainable local communities Experiences from pilot project in Nordland, Norway 2018-2021 |
| | **179** Integrated visitor management. The Norwegian regional parks as integration actors |
| | **51** Local spatial planning as tool for integrated visitor strategies and community development |
| | **161** Creating synergies between nature-based tourism and local community development through enhanced dialogue processes. |

# 99 Efforts to improve sustainable tourism and environment sustainability: understanding from local people's perspective in Sagarmatha National Park and Buffer Zone, Nepal Himalaya

**Yujie Sun**[1], **Teiji Watanabe**[2], [1]Graduate School of Environmental Science, Hokkaido University, Japan. [2]Faculty of Environmental Earth Science, Hokkaido University, Japan

**Introduction**

Nature- and culture-based tourism have been prevalent pathways for most of the world's indigenous people (McLaren, 2003). Tourism has been a significant component of Nepal's economy. Mountain tourism plays a leading role in Nepal's tourism industry. Sagarmatha National Park and Buffer Zone (SNPBZ) is the third-largest visited protected area in Nepal (Ministry of Culture, Tourism, and Civiation, 2020).

Rapid development of tourism has brought remarkable changes in SNPBZ. Spoon (2012) and Stevens (1991, 1993) discussed tourism impacts on cultural values and lifestyle of mountain residents. Nepal (2005) argued the unequal power structures and income differences induced by tourism in the park.

Tourism is one of the essential elements to realize sustainable mountain development. To realize sustainable tourism, it is vital to enhance the well-being of residents and visitor experience in mountain regions. Therefore, this study aims to investigate the efforts made by local residents to improve sustainable tourism and environment sustainability in SNPBZ.

Study area

SNPBZ locates in the eastern part of Nepal. Founded in 1976, the park was listed as a World Heritage Site in 1979 because of its outstanding natural and cultural resources (Baral et al., 2017a, 2017b). The core zone of the park covers an area of 1,148 km$^2$. The buffer zone, established in the south of the core zone in 2002, covers an area of 275 km$^2$. The landscape in the park embodies mountains, glaciers, and rivers, ranging from 2,800 to 8,848 m.

Until March 2017, the park area consisted of three village development committees (VDCs), namely Chaurikharka as the buffer zone and Namche and Khumjung as the core zone. After that, a new local-level government, Khumbu Pasang Llamu Rural Municipality, was established to replace the VDCs. The inhabitant population in the park is predominantly Sherpas, followed by Rai, Tamang, and other ethnic groups.

With the first ascent of Mt. Everest by Edmund Hillary and Tenzing Norgay on 29 May 1953, significant trekking and sightseeing activities began in the Everest region, bringing profound changes to the Sherpa's economy. Trekking and mountaineering activities are generally conducted in the spring and fall seasons. Visitors trek either in single or group in the park. The number of visitors to the park had increased from 5,836 in 1980 to 52,424 in 2019 (SNP Jorsalle Entry Point).

Methods

This study is based on four sources: (1) literature review on Sherpa tourism; (2) on-site interviews mainly with lodge owners, government officials, trekking guides, and visitors between 2017 and 2019; (3) field observations between 2017 and 2019; and (4) 2 group discussions with local communities.

In total, this study conducted 41 interviews: 13 with lodge owners, 8 with visitors, 7 with government officials, 6 with trekking guides, 3 with lodge managers, 2 with school principals, and 2 with shop owners. This study employed two types of interviews. The interviews with eight visitors were open-ended and conducted in Chinese, Japanese, and English. The other 33 interviews with local people were semi-structured and conducted in English. The visitors' interview questions focused on general opinions and their experience of tourism in the park. The interview questions with local people mainly focused on tourism and park development, activities conducted in the park, and perceived benefits and costs in the park.

Results

The interview survey revealed that local people in SNPBZ had conducted various activities to improve

| Category | Type | Village | Name of Organization | Activities |
|---|---|---|---|---|
| Community | Tourism-related | Toktok, Zamphute, Benkar | Culture and Environment Conservation Youth Club | Trekking trails repair; construction of Sherpa dancing hall to attract tourists to stay overnight |
| | | Namche Bazaar | Hotel Association | Setting lodge sign board; standardizing the price of common rooms; providing clothes to porters |
| | Environment-related | Namche Bazaar | Women's Group | Gabbage collection regularly in the village |
| | | Namche Bazaar | Sagarmatha Pollution Control Committee | Construction and management of public toilets and water supply along trekking trails; construction of garbage bins and awareness program at schools; collecting gabbage from Everest Base Camp every year |
| | | Khumjung, Pangboche, Phortse | Khumbu Sherpa Culture Conservation Society | Nawa forest management system; setting bird conservation area |
| | | Thamo | Thamo community | Stopping firewood collection |
| | | Benkar | Himalayan Plantation Proramme | Tree nursery and plantation in needy place |
| Individual | Tourism-related | Namche Bazaar | Sonam Sherpa | Expanding Sherpa Culture Museum |
| | | Near Namche Bazaar | Pasang Sherpa | Building and maintaining the trekking trail to Everest Base Camp (from 1984) |

*Table 1. Summary of tourism and environment improvement activities conducted by local people in SNPBZ, many of which are related to sustainable tourism and environment sustainability.*

tourism development and environment conservation, many of which may lead to sustainable tourism and environment sustainability (Table 1). Communities and individuals carried out these activities although many of the activities may be unconscious behavior. Furthermore, there are mainly two types of activities: one is tourism-related, and another is environment-related.

## Discussion

The interview results with local people indicated the existence of imbalanced development and benefits among villages. Most local people agreed that villages along the main trekking routes benefited more than those located away from the main routes. In less developed villages such as Benkar, local residents need to develop strategies to design those villages to facilitate experiences to enhance visitors' perceived experience value: otherwise, sustainability of those villages would not be guaranteed. The interview results with visitors indicate that hygiene is a top concern by visitors, and Sherpa culture is barely known among the visitors.

## Conclusion

Mitigating the imbalanced tourism development and unequal benefits and increase visitors' experiences is crucial for the development of sustainable tourism destinations and villages. The findings of this study showed that local residents have conducted a variety of activities to enhance visitors' experience and environment sustainability in SNPBZ. However, whether these activities can mitigate the challenges above needs further examination.

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# 123 Where green is greener? Multi-data approach for typology of urban green spaces

**Marta DEREK[1]**, **Sylwia KULCZYK[1]**, **Edyta WOŹNIAK[2]**, **Tomasz GRZYB[1]**, [1]University of Warsaw, Faculty of Geography and Regional Studies, Poland. [2]Polish Academy of Sciences, Space Research Centre, Poland

As the global level of urbanization is rising, with 74% of Europeans living in urban areas (United Nations, 2018), public green spaces located within urban and peri-urban zone remain the most accessible (and sometimes unique) option of direct contact with nature. Such a contact can provide a variety of immaterial benefits for humans, identified as Cultural Ecosystem Services (CES). Like other Ecosystem Services (ES), CES are vulnerable to external impacts, such as urbanization processes. However, unlike other types of ES, cultural values of ecosystems or landscapes are irreplaceable: once destroyed, cannot be restituted (Plieninger et al., 2013). Therefore, their proper management is the issue of a great importance. CES are co-production of environmental features and cultural practices, what results in a constant need for new methodological solutions based on interdisciplinary approaches. Understanding patterns of CES flow is recognized as crucial for effective landscape management and policy development (van Zanten et al., 2016).

Hegetschweiler et al. (2017) found out that studies which had examined CES in urban areas tend to focus on supply or demand factors, but rarely establish links between one another. The need of further research on linkages between different types of green infrastructure, a variety of forms of their use as well as on gained benefits is also underlined by O'Brien et al. (2017). Such an approach requires combining natural and social data together. In this study we address this challenge.

The aim of the research is to develop a typology of public green spaces (hereinafter PGS) in an urban zone, basing on the character of CES flow. As this flow can be influenced by management, it is important to propose an approach which will include a variety of data reflecting natural features of PGS as well as preferences and behaviours of its visitors. A typology of urban green areas can help in successful management especially on the urban zone level, where a more holistic and integrated approach is needed.

In this study, we address three interconnected types of CES: recreational, educational and aesthetical services; all recognized as important CES by the most popular ES classifications (MEA, TEEB, CICES). Warsaw Urban Zone, understood as the city of Warsaw and its border zone (18 municipalities which border the capital city) will be used as an example. We will focus on green spaces that are publicly accessible and cover at least 2 ha. According to Zick et al. (2009) this is the minimum size of green area that allows an adult person for active recreation and brings a chance for isolation from urban buzz. We adopt a hierarchical approach and connect a set of different data, both natural and social, into the analysis; namely:

- Data reflecting a spatial context of PGS. A place of PGS within the structure of green areas in Warsaw Urban Zone (e.g. isolation, patch cohesion), as well as their accessibility for potential users (e.g. population within different distance zones), will be taken into account;
- Data reflecting an ecological context of PGS. The size, shape, land cover diversity and presence of unique natural objects will measure physical availability. Presence in social media and/or events organized in PGS will reflect its intellectual availability;
- Data reflecting a social context of PGS. This demand side of using green areas will be shown by data from a survey undertaken on a representative sample of 1000 residents of Warsaw Urban Zone, and will indicate, among others, the activities and preferences towards PGS (see Figure 1).

This multi-data approach (and, consequently, a multi-method approach) will result in developing eight different typologies of PGS, each based on specific spatial, ecological and social contexts (Figure 1). Spatial diversity of all the gathered characteristics will be analyzed. It will serve to identify relations between public green spaces and their users within the urban area. Finally, by merging the created eight

typologies, the final typology of urban public green spaces based on the character of CES flow will be developed, and shown on the map of Warsaw Urban Zone.

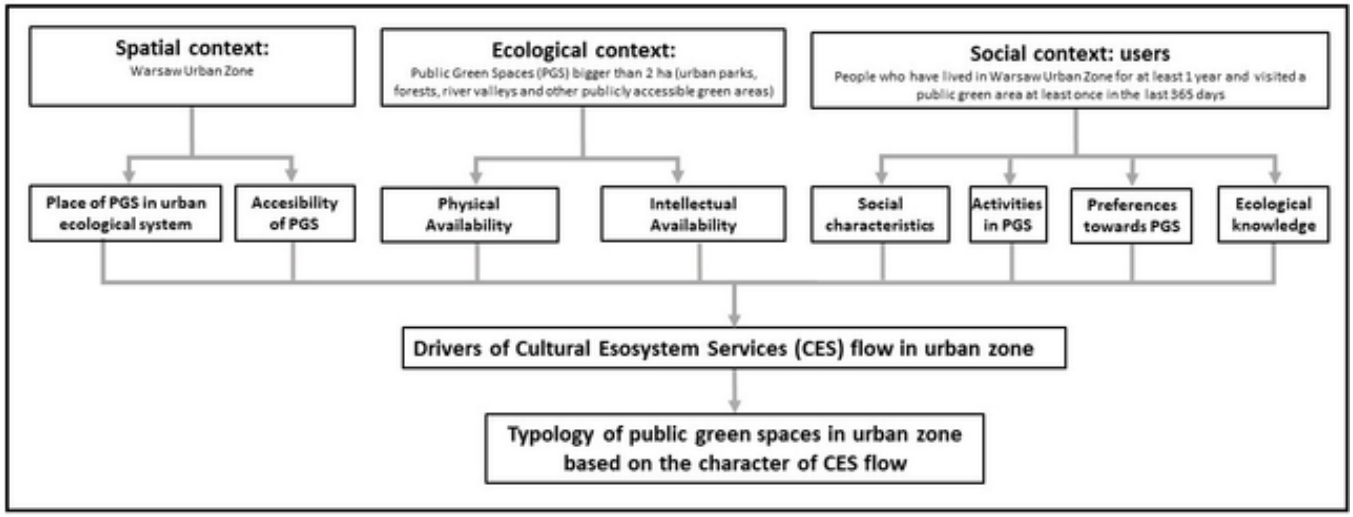


***Figure 1.*** *The scheme of the research*

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# 128 Intentional and incidental nature experiences in urban nature

**Yu Liu**, **Anton Stahl Olafsson**, University of Copenhagen, Denmark

**Introduction**

The importance of urban nature has been emphasized alongside the concept of sustainable city and urban livability. Urban nature can refer to all kinds of green spaces, such as lawns, community gardens, urban parks, urban forests and urban cemeteries. It is known that urban nature delivers the cultural ecosystem services that largely link to human well-being. Hence, many scholars focus on multi-functionality of urban nature (Fagerholm et al., 2019; Hansen et al., 2019), and try to find the link between motives and experiences (Vierikko et al., 2020) in order to have a broad understanding of the day to day practice of urban nature. However, due to the extinction of the experiences and loss of human-nature interactions, more research should pay attention to nature experiences in order to develop sustainable urban recreational destinations with high citizens' experiential values.

The built environment with access to infrastructure and green spaces are preferred during the lockdown (Amerio et al., 2020). The human-nature interaction is greatly motivated by intentional uses of urban nature provided by infrastructures, and the fact urban nature can provide spaces for social activities and so on. Yet, little is focus on how restorative experiences, emotions, surprises and sensory experiences can encourage urban dwellers a close contact with nature. Does the increasing recreational use of urban nature at this special moment indicate an increasing need of restorative benefits and better well-being from the urban nature? And is the intentional recreational use of urban nature generated by any incidental experiences gained from urban nature or indirect use of urban nature, due to the fact that well-practiced behaviors are generated by incidental experience? This study categorizes nature experiences into intentional nature experiences and incidental nature experiences, and aims to answer the following questions (1) what is intentional and incidental nature experience and what are the most common mapped activities in terms of the intentional and incidental use of urban nature (2) which type of urban nature and which landscape feature(s) can provide more intentional or incidental nature experiences (3) what is the relationship between these two kinds of nature experiences?

**Material and methods**

PPGIS survey is conducted in the platform of Maptionnaire. The PPGIS survey provides questions about gender, year of birth, the number of people in household, the number of children, the level of education and working status. Then, places visited are mapped with side questions about experiential values among 19 options, while home address of each respondent is asked to identify. Respondents can choose more than one among these 19 options, which are Biodiversity, Close to nature, Walk/Stroll, Being Outdoors, Aesthetic View, Nature Sounds/Silence, Observe Nature, Relax Recharge, Nice Smells, Being With Family and Friends, Exercise/Sport, Cultural Heritage, Feelings/Inspiration/Surprise, Spiritual values, Picnic, Play with Children, Dog Walking, Shortcut and Closeness to Water. For each place or route, respondents are asked to identify means of transportation and frequency of visit.

**Study area and data collection**

The case study area is Copenhagen urban area. PPGIS survey was handed out to citizen panels of five local districts in Copenhagen from May to August 2020. We obtained the data with 4947 home addresses, 8819 visited places as well as 39235 mapped experiential values.

Preliminary results

Incidental nature experience in this study refers to experiencing or being in nature through direct intention, such as picnic, meeting with friends. Incidental nature experience includes all sensory experiences in this study. Among all 19 experiential values, this study shows people travel longer distance from home for experiences such as Closeness to water, Exercise or Sport, Close to nature and Aesthetic views. These experiences are highly environment dominated.

Green and blue features are the most important elements in urban nature. Hence, this study also explore how nature experiences are associated with tree cover density and distance to water feature individually. People mapped experiential values related to high tree cover density when they visited places with cultural heritages, spiritual values, nice smells and high biodiversity index. When people want to experience aesthetic views, purely be close to nature or exercise/sport, they tend to visited places with close distance to water.

We also find the incidental nature experiences and intentional nature experiences are intertwined. So incidental nature experiences can be regards as by-products of intentional nature experience.

**Next step**

Later in this study, we will focus more on the type of urban nature in terms of providing these two kinds of nature experiences. This study will further identify the linkage between individual incidental nature experiences and intentional nature experiences. Considering motives for people to use urban nature as recreational destinations, we also aim to discuss how to plan and manage urban nature in terms of intentional and incidental nature experiences to the long-term sustainability.

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# 189 Tradition and destination: Socio-ecological sustainability and the host-visitor interface in second-home development in Norway

**Marianne Singsaas[1]**, **Vegard Gundersen[2]**, [1]Telemark Research Institute, Norway. [2]Norwegian Institute for Nature Research, Norway

**Introduction**

Second homes (SH) are a major form of domestic tourism in many countries, especially the Nordic countries. Nearly 50% of Norway's population have access to at least one SH. Over the last 20–30 years, the average SH size has increased significantly (62.2 $m^2$ in 1983 to 96.2 $m^2$ in 2019) and a typical SH now holds very high material standard. Moreover, four times as many SHs were built in 2019 compared to 1983 (6455 versus 1600). In this period, the majority of the second home growth in Norway has taken place in the rural mountain areas (Skjeggedal et al. 2016), placing these areas under a multitude of interrelated pressures; Buildings and activities place local nature and biodiversity under pressure, but in addition the modern SHD trend also places pressure on the host-visitor relationships and land management systems, as well as altering local economies.

Compared to other forms of recreation and tourism, Second home developments (SHD) poses particular challenges. SH owners are tourists, and exert similar impact on hosting communities, however, the dwelling use (Paris, 2014) of SHs, characterized by extended and repeated visits, sometimes spanning generations, implies different social, economic and ecological impacts than from other forms of tourism.

Covering 39% of the total Norwegian area and 70% of Norway's protected land, mountain municipalities are facing negative population trends, decreasing economic opportunities in the traditional industries and low accessibility to important public services. Since the 1990s rural areas have increasingly been portrayed as arenas for post-productivist amenity and leisure production for a growing urban population (Perkins 2006; Overvåg 2010; Rønningen & Flemsæter 2016). With widespread second home developments, intensive tourism developments, and other recreational use, new actors are claiming a stake in the outfields and in local governance (Overvåg et al. 2016).

Existing research tends not to have dealt holistically with SH pressures. Despite a growing literature on the challenges mountain communities face (e.g. Arnesen et al. 2010) and the commodification's of rural resources (Perkins 2006, Rønningen & Flemsæter 2016), descriptions and analyses of local inhabitants and SH owners land use practices, experiences and meanings are still scarce. Without a better understanding of the increasing and transforming SH developments and its competing interests, values and practices, the pressures related to SH is likely to intensify, leading to conflicts and hampering ecological as well as economic and social sustainability.

As the SH transforms to year-round use and even as a primary residence, the changed and increased recreational practices have put pressure on ecosystems (e.g. wild reindeer habitats), sheep and reindeer herding practices and local nature practices such as hunting and berry picking (e.g. Arnesen et al. 2019). Thus, recent SHD has increased tensions between nature users and nature conservationists and between hosts carrying out traditional local practices and visitors challenging these.

While an array of branding and visitation strategies, initiated by national government, are being developed in protected areas throughout Norway, there is a lack of national policies and institutional support for SH management in local communities surrounding protected areas. While protected areas area managed by the State, SH planning lies within the realm of local government. Local authorities are thus in a strong position to guide development, however, as Hall and Müller (2004) points out, it can also result in a lack of regional and national consistency in planning guidelines. The double challenge local councils face; few formal tools for visitation regulations outside protected areas, and the distinctive impacts from dwelling SH users, highlights the need for transgressing the current focus on building regulation, to a wider comprehensive planning for social sustainability in addition to economical and ecological sustainability. We therefore look at

how SH are incorporated into the strategic planning process at local and regional levels, in ensuring sustainable development of SH in a broad sense.
To better understand the degree and implications of these tensions and pressures, there is need to take a bottom-up perspective, looking at the SHD phenomenon by investigating different groups of people's nature-based practices, their values and expressed attitudes and meanings, to further develop insights of relevance to local as well as national decision-making processes enabling a more sustainable second home development.

**Methods**

We have selected three municipalities where local growth management will most likely be required to handle effects of SHD (Table 1).

We are in the process of conducting interviews in the two case regions, to explore the connection between self, practice and place. We have also conducted a document analysis to examine policies and regulations with relevance to sustainable SHD. To answer questions related to barriers for sustainable SHD, we will do 40 individual interviews with local villagers and SH owners, managers and policy-makers at the local level. Workshops with key stakeholders will be arranged in the case areas, early and late in the project, to explore the insights gained through the interviews and document analysis.

*Table 1. The two case study areas in "Tradition and destination" including three municipalities.*

| | **SHD information from:** | **Building on existing knowledge:** |
|---|---|---|
|  | The Hardangervidda region: South-central Norway. Hardangervidda national park (3422 km$^2$). Main industries; tourism, agriculture. 10 municipalities: Study area Vinje: 3$^{rd}$ highest number of SH in Norway, 5278 cabins, more SH than permanent dwellings, with a cabin surplus of over 2,500 units. | R&D project wild reindeer (since 2001, n>200 GPS collared ind. reindeer), comprehensive data on human use. Vulnerability analyses, vegetation wear, wildlife disturbance. NINA: A broad local Stakeholder Group. |
|  | The Rondane region: South-central Norway. Rondane national park (963 km$^2$). Main industries; tourism, agriculture. 8 municipalities: Study area Ringebu and Stor-Elvdal. Tremendous increase in SHD the last decades. | R&D project wild reindeer and comprehensive data on human use (since 2009, n>40 GPS ind. reindeer). Vulnerability analyses, vegetation wear, wildlife disturbance. NINA: A broad local Stakeholder Group. |

# 53 Visitor management as a tool to develop sustainable local communities Experiences from pilot project in Nordland, Norway 2018-2021

**Hanne Lykkja**, Nordland County Council, Norway

Global travel has exploded in recent decades and challenges the current management system. How can attractive destinations like the popular Lofoten islands in Northern Norway face the "tsunami" of new travelers? Who will pay the hidden costs? The effect of strong growth in the number of visitors and changes in travel patterns, type of experiences, as well as visitor behavior is now creating a challenge for many communities and destinations. How can the local communities be empowered to take more control over their own tourism development?

Nordland extends about 250 km both north and south of the polar circle and offers exciting experiences connected to a broad range of landscapes, it borders the North Atlantic which creates a climate more moderate than any other place in the arctic.

Nordland County Council (fylkeskommune) which runs this project, is the regional governing administration of Nordland county, running upper secondary schools, county roads, public transport, culture and cultural heritage, providing regional planning strategies and advising its 41 municipalities in local planning and management. Nordland County Council has worked systematically with experience-based tourism for the last 10 years and this project is anchored in the Strategy for Tourism and Innovation. What characterizes tourism is that, because production and consumption of the experience takes place in the same place, customers are brought to the place of production. This is the reason why tourism greatly affects the communities in which it is practiced. The aim of the pilot project is to develop tools and methods that ensure sustainable visitor management. The focus is to empower communities to participate in the development process as they bring local knowledge which can make the difference between a policy succeeding or failing. The object of this project is to involve communities and other actors in a holistic way, in order to develop tools which will help to take care of nature and the environment, ensure that the experience is good for both visitors and residents, while the local value creation is the greatest possible. The figure below shows some of the sub-projects within its focus.


5 questions that provide direction for the work locally, regionally, and nationally

In the dialogue on societal development, we need a vision for tourism. What we want tourism to do for us depends on the society we want in the future. How can tourism help us create that development? We have taken inspiration from Ireland for this work: **Cillian Murphy: Whose place is it anyway? - Besøksforvaltning (nfk.no)**, 2018) These are questions which have to be asked by local communities in order to produce sustainable results, regardless of where those communities are.

1) Why do we need visitors?
2) What do we have? - What resources do we have that we want to build tourism on?
3) Where do we want visitors - and when is it acceptable for visitors to come? Are there any places and times we do not want visitors? (need to be discussed with other industries).
4) Who do we want to invite home?
5) How do we get the right visitors? We know that there is a limit to how much we can manage tourism, but we can choose to work actively to get the right visitors to achieve the long-term vision for our village and our region.

The questions are used to promote increased knowledge and competence for all actors and manage-ment levels in the project. The first four are about local community development, - and are far too important to leave to the tourism industry alone. The fifth concerns marketing. Who provides good value creation and what hidden costs does it entail to invest in different groups? The focuses include:

Local communities / local groups / voluntary sector: Hamlets and villages with many visitors asked for help in managing traffic, creating good meeting points, and finding the place's resilience for balanced development. Together with them, we have developed crash courses in visitor management for the voluntary sector.

The tourism industry (incl. influencers) has participated in communication projects and developing a new understanding and competence in what responsible marketing means in practice.

Public planning and administration are major areas of work. Meløy Municipality will integrate visitor management in municipal spatial planning according to the Planning and Building Act. Vega municipality wants to develop a comprehensive destination management program. Inter-municipal approaches to remedy acute problems with parking, rubbish and sanitation are being tested in Lofoten. Municipalities have established professional groups and committees for visitor management. Interdisciplinary collaboration and routines are being built up internally in the County Council. Together with NMBU, we have developed a first course in visitor management for planners and administrators at university level in Norway. According to Innovation Norway, Visitor management is a key to the new national Tourism Strategy, and we work closely with the Norwegian Environment Agency on visitor management for national tourist trails and other areas with many visitors, such as cultural landscapes and heritage sites.

Educating local politicians: The pilot project has developed an introductory course in collaboration with KS (the organization for all local governments in Norway). Together with NORD University in Bodø, a follow-up course for community development in the light of ecological economics has been developed, with visitor management as a recurring theme (4 evenings). The course inspires politicians to work with communities to come up with mutual solutions which will produce sustainable tourism offerings which will satisfy both communities and those responsible for their economies.

We know we must prepare for waves of big change. Challenges include Covid-19, economic decline, climate change and a great decline in biological diversity. Visitor management is a new field, and we see that it helps us to think in new ways and work systematically together across disciplines and management levels, to create a society we want in the future. Business as usual is not an option. The County Council, in collaboration with its communities, families and businesses, has a key role in building back better!

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# 179 Integrated visitor management. The Norwegian regional parks as integration actors

**Mathea Sætre Liberg**, **Kristian Bjørnstad**, Norwegian Parks Association, Norway

Visitor management in Norway has primarily been focused inside protected areas. However, there is an urgent challenge to work in more integrated ways to create more connections with surrounding communities. After the Norwegian Environment Agency published its guide for visitor management in protected areas (2015), several of the Norwegian national parks have increased its focus on visitor management. Although many national parks have such plans, there is still a challenge in how the national parks respond to the needs and challenges of local communities outside its borders. In a recent study from 2021, Aasen Lundberg et al. pointed out that the national parks in Norway are weak at creating connections with communities outside the borders of the protected areas. Based on this, we would argue that there is a clear need in Norway for more integrated approaches for visitor management and park planning.

New dynamic and more integrated park models have emerged in continental Europe during the last few decades (Mose et al. 2007). However, Norway has been slow in adopting these models. Europe´s Regional Nature Landscape Parks (NRL) (Europarc Federation 2020) exemplify the "integration approach" through more participatory park models present in 22 countries. The integrated park policies and the regional nature parks of Switzerland is a good example of a new park model promoting integrated and bottom-up approaches. They are legitimized through national laws and planning instruments, and perform well in facilitating sectoral interests by combining both vertical and horizontal integrations (Hammer and Siegrist 2016)

Inspired by the French and Swiss regional nature parks, the Norwegian regional parks have developed from the bottom-up. In contrast to Switzerland, the Norwegian regional parks are not yet anchored in national legislation. However, they do act as effective platforms for different local and regional actors in integrated ways (Stokke et al. 2016). The regional parks work across sectors and at different levels. They work in the "in between areas" where sectoral authorities do not often reach. They establish broad partnerships with local authorities, community associations and commercial firms.

In this study, we have focused on the experiences of two Norwegian regional parks that have worked with visitor management in recent year. They are one of the first non-protected areas working with visitor management in Norway. It is the Nærøyfjord World Heritage Park and the Okstindan nature and culture park. As regional parks they are not formally recognized as protected areas.

The Nærøyfjord World Heritage Park is a combined regional park surrounding a UNESCO World Heritage Site with approx. 700,000 annual visitors. This leads to pressure on the local population and the conservation values in the area. After they started working systematically with visitor management in 2014, they have managed to put it on the agenda both politically and within the tourism industry. The experience of Nærøyfjorden World Heritage Park shows that the regional park act as a common forum and as a collaborative platform. The park administration is working to find concrete solutions to the various challenges uncovered during the process.

By working wider than just within the protected limits, the park has succeeded in engaging more actors. They have thus helped to put visitor management on the agenda in a regional perspective that goes beyond just safeguarding the conservation values. By taking a role in between the public and the private sector as an integration actor, the park has succeeded in contributing to a management that takes greater account of the local population and thus also provides a better experience to the visitors.

The other regional park that has worked with visitor management is the Okstindan nature and culture park. They started their work with visitor management in 2015 as a response to the building of the Rabothytta, a tourist association cabin that saw a sharp rise in visitation leading to conflict among local residents. A visitor management project was initiated and a visitor strategy was prepared with specific

measures. The work that has been done during the last few years has led to better management of the area and more positive attitudes. The park has engaged landowners and other resource persons in the process and this have given them more co-ownership of how the area is managed.

Okstindan nature and culture park now encounter a lot of positive attitude in local communities related to the visitor management of Okstindan. The experience of the park is that they can take on a different role than the municipality and can in a good way lead to a constructive collaboration with teams and associations, volunteers, the business community and others.

Experience from both regional parks show that there is an important role for visitor management outside formally protected areas. Visitor management is something that could be actively pursued in all regions to facilitate visitors and to meet the needs of local communities. By having a bottom-up approach, involving the local population, working across sectors and implementing concrete measures, the experience from these two regional parks is that a there is an important function for, and a need for, regional parks as "integration actors". Although not institutionalized or formally recognized as protected areas, the regional parks of Norway can perform important integrative functions in their regions. The experiences with more integrated models of parks from countries like Switzerland could potentially inspire reforms in Norwegian park policy and practice in the coming years.

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# 51 Local spatial planning as tool for integrated visitor strategies and community development

**Knut Bjørn Stokke**, **Morten Clemetsen**, Norwegian University of Life Sciences, Norway

Nature-based tourism is to a large extent based on different types of protected areas, adjacent landscapes and communities. In this paper we explore how municipal spatial planning may serve as a tool for integrated visitor strategies and community development. In Norway, visitor strategies are introduced for national parks and other large protected areas. These strategies are based on the planning system inside protected areas, regulated by the Nature Diversity Act. The research question is: How can local spatial planning support integrated visitor strategies and community development?

Norway has two different institutional systems for spatial planning within and outside protected areas. The relationship between these two planning systems is often conflict-ridden and dominated by contrasting paradigms (Stokke and Clemetsen 2021). Norwegian conservation policy has been rather restricted and wilderness oriented, focusing on protecting nature from human activities. At the same time, spatial planning, where the municipalities are the main planning authority, primarily focuses on development and urban and built-up environments.

Findings from analyses of three protected areas in Norway, Varanger Peninsula National Park, Fulufjellet National Park and Folgefonna National Park, show that the integration of the planning systems across protected area borders, is rather undeveloped (Stokke & Clemetsen 2021). Spatial planning in the municipalities according to the Planning & Building Act (PBA), on the one hand, and the planning efforts within the protected areas according to the Nature Diversity Act, on the other hand, have only been linked together to a minimum degree.

Implementation of visitor strategies for the national parks and other large protected areas in order to facilitate sustainable nature-based tourism, could be regarded as a “golden opportunity” for integrated planning across protected area borders, because most of the infrastructure development related to tourism activities is located in areas adjacent to the national park borders. However, the findings from the above-mentioned study show that the visitor strategies are mostly focused on the areas inside the protected area borders and on some selected entrance points. Little attention is paid to the adjacent communities. Municipal spatial planning according to the PBA is not being applied to fulfill the ambitious aims expressed in the visitor strategies with respect to protect vulnerable nature, facilitate attractive visitor experiences and contribute to community development.

In Norway, spatial planning according to the PBA serves as a comprehensive system to balance nature conservation and community development interests and is considered an integrated tool for sustainable development. The municipalities are the primary planning authority, where their elected bodies, the municipal councils, approve the plans. Local participation and cooperation with relevant sector authorities in the planning processes is emphasized. In our view, visitor strategies should therefore be integrated in the municipal master plans to be able to fulfil its aims.

To illustrate how community development and spatial planning can be included in visitor strategies, we present a student work from the master-course in Regional landscape planning and community development that we organize at NMBU (Clemetsen and Stokke 2019). In September 2019, we were one week in Hardanger in Western Norway on a field study of Folgefonna National Park. Folgefonna is the third largest glacier in Norway and has relatively a high number of visitors. An important motive for the students’ involvement was to support community development in the adjacent communities based on place-based resources connected to nature and culture, and to create meeting places between inhabitants and tourists.

The student group work we present here focuses on entrance points to Folgefonna National Park. An important starting point was the ongoing process with a visitor strategy for the National Park, where a draft was out on public hearing. Through interviews with the National Park Manager and other

public and private actors, they chose to investigate one entrance point to Folgefonna, Bondhusdalen (see Figure) in further detail. This is a popular gateway to the glacier and the lack of parking areas has been a crucial challenge addressed in the draft visitor strategy for the Park. However, the students realized quite early in their work that the affected local community, Sundal, was not included in the formal visitor strategy. Through landscape analyses and qualitative in-depth interviews with representatives from the community, they developed a feasibility study on how Sundal and the agricultural landscape between the fjord and national park entrance point (Bondhusdalen) can be integrated in a more comprehensive visitor strategy (illustrated by a feasibility map in the Figure below).

Figure 1. Feasibility map of the community Sundal and Bondhusdalen.**[JVH1]** (Legends in Norwegian)

The small community Sundal by the Hardangerfjord has a long and rich history of tourism, dating back to the time when tourists mainly came by boats. Today Sundal is “a hidden place” people are just driving through, either to the parking area at the Folgefonna entrance point or to another place in the region. Based on the feasibility study, the students suggested various strategies and concrete measures to strengthen the community and the landscapes between Sundal and the National Park. One central strategy is proposed to facilitate visitation in Sundal by offering more varied experiences and to reduce the traffic speed on the main road through the village. Another strategy is the revitalizing of the harbor area in order to re-establish a ferry route on the Hardangerfjord. They also suggest opening up the fjord for the public by creating a coastal trail, in addition to developing a pathway from Sundal, through the agricultural valley of Bondhusdalen and up to the National Park. Such strategies may reduce the pressure on the parking area at the entrance point to the National Park. To be able to realize such strategies for integrated community development and tourism development, it is important to activate municipal planning according to the Planning & Building Act.


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# 161 Creating synergies between nature-based tourism and local community development through enhanced dialogue processes.

**Morten Clemetsen**, **Knut Bjørn Stokke**, Norwegian University of Life Sciences, Norway

Nature-based tourism (NBT) has for decades been a major resource for value creation and local development in rural districts in Norway. However, in recent years some areas have experienced an increasing pressure from the tourism industry, both in fjord- and coastal and mountain regions (Stokke et al. 2017). A more fine-tuned and sensitive attitude to attractions related to wildlife, quietness, and local stories and storytelling is emerging, and has a substantial potential for integrating NBT and local community development. In a long-term perspective, it is essential for municipalities and local communities to balance the influx of tourists and the capacity to welcome them. To inform planning and development processes, it is therefore important to understand the tangible and intangible place-based values and resources attached to minor rural communities.

In the present global situation represented by the pandemic lock down, climate and bio-diversity crises, there is a growing awareness in local and regional governments, that tourism in general, and nature-based tourism specifically, also should be a partner in developing place-based and sustainable transition-processes (Clemetsen et al 2021). This might involve a broad variety of actors, from local residents – young and older, small scale entrepreneurs, farmers, schools, municipal administrators, etc. Thus, in the process of developing strategies for an unknown and uncertain future, there is a need to apply appropriate process tools that may foster development of shared visions, strategies and measures that support sustainable development.

The complexity in the process of understanding place, place-based values, and their potential for future value creation, demand methods that commits the participants beyond what is required in ordinary local planning processes. To pursue this ambition, it is necessary to create arenas for negotiation of interests, and for developing strategies for social and economic initiatives involving the local community, the municipality, and other stakeholders.

On the background of a participatory workshop conducted in the BIOTOUR**[1]** case area in Trysil municipality in 2019, we will discuss possible methods and tools that can provide arenas for dialogue processes, supporting nature-based tourism development and social viability within the local community.

**The case area; Trysil municipality and the local villages of Ljørdalen.**

The municipality of Trysil covers 3000 sq.km and is located in the great forests along the border-region to Sweden, in south-east Norway. There are under 7000 permanent residents in Trysil, growing to 30000 in the major holiday periods, as a top winter and summer destination. Tourism is a substantial part of the local economy. The municipal center is located along the Trysil river, and there are 7 minor rural village centers ("grend"). The potential capacity of villages for supporting local economy and social resilience are often neglected in conventional municipal planning. Traditional stories, myths, legends as well as experienced nature-based knowledge has a substantial potential in nature-based tourism. The major challenge is to share and to make this knowledge operational within the local community, without compromising people's values and identity with place.

One of these villages is Ljørdalen, located close to the border to Sweden and the Fulufjellet National Park. A workshop addressing the entrepreneurial and community potential for future nature-based value creation, was conducted.

**Dialogue processes and methods applied in the Ljørdalen workshop**

The methodological experiences in approaching and performing dialogue processes in Ljørdalen was based on two methodological tools; Participatory, adaptive storytelling and Open Space workshop (Owen 2008). Through the participatory storytelling approach, residents, tourism entrepreneurs, municipal staff members and others were invited to share personal experiences or other stories that expressed certain characteristics and values connected

to the place. The title of the workshop was "Local community and nature-based tourism- – two sides of the same coin?"

The first section of the workshop was based on expressing values and identity to place; each participant was asked to present an object (token) and share a story of the meaning behind this

The second section was based on the Open Space methodology. On the background of a shared understanding of the place-based values, stories and assets, each participant was asked to present a personal and value-based key question related to important future issues of place development. These questions were in turn, discussed in smaller groups, providing a basis for future scenario and strategies. The contributions were systemised and merged into some major question, which were discussed in groups.

Three of the questions were as follows:

- What should be the content of a guided bear safari, to be considered a peak-product?
- What are the main characteristics of a valuable cultural landscape? How can we maintain and manage the qualities?
- What kind of activities can be offered to children and young people, that involves two or more people in the valley?

This type of questions expresses essential place-based values and challenges, and the processes itself provided a feasible arena for discussing future development issues within the framework of co-creative motives among the actors involved. According to the participant from the municipal administration, the outcome of the workshop should also fit well into the intended objectives of the social part of the municipal master plan. The methodology developed in this case study, may serve both the local development processes in the small communities ("grendene"), and at the same time provide input to the social part of the municipal masterplan. This may help to anchor local development strategies, and vitalize this type of planning instrument, which up to now has not been fully recognised. In general, this may also strengthen the local community democracy.

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# The sharing economy – Supply, demand and consequences

| SESSION | PART | DATE | TIME | CHAIRS |
|---|---|---|---|---|
| 8B | - | Thursday 19th August | 13.30 – 14.50 CET | Leif E. Hem & Merethe G. Lerfald |

| | Programme |
|---|---|
| *8B* | **21** Sharing in the context of nature-based tourism |
| | **46** The sharing economy in the context of outdoor recreation and nature-based tourism in Innlandet County, Norway |
| | **76** Customer-focused drivers in the sharing economy: A meta-analysis |
| | **22** Actor role-resource interactions in emerging sharing-economy businesses: A case study from Danish sharing-economy entrepreneurs |

# 21 Sharing in the context of nature-based tourism

**Kristine Blekastad Sagheim**[1], **Merethe Lerfald**[2], **Stine Kvamme**[2], [1]Inland Norway University of Applied Sciences, Norway. [2]Eastern Norway Research Institute at Inland Norway University of Applied Sciences, Norway

**Introduction**

The tourism sector is impacted by megatrends such as increased availability of high-tech equipment, information and communication technology (ICT) and the sharing economy (SE) (Elmahdy et al. 2017). High-tech equipment and clothing provide tourists with increased comfort and safety. The ICT enables online booking and digital communication and in recent years, digital platforms have enabled sharing of underutilized assets with strangers. These global trends expect to affect 'the demand for nature-based tourism experiences, and the way people engage with nature' (Fredman & Margaryan 2020, p. 6).

A part of the nature-based tourism (NBT) sector is equipment-intensive, with activity-adapted development of specialized equipment and clothing (e.g., Randonnée, kiting, kayaking). The equipment is often expensive and underutilized. One of the key themes in the NBT literature is to understand the role of NBT in the context of global transformations as (among others) the SE (Elmahdy et al. 2017; Fredman & Margaryan 2020). The SE includes a broad set of activities and concepts, from Airbnb and Uber to companies enabling temporary transactions of assets, often labelled 'access-based consumption' (Eckhardt & Bardhi 2015) or 'on-demand renters' (Trabucchi et al. 2019). The focus in 'access-based consumption', is to gain access to goods or services for a limited period without acquiring ownership (Eckhardt & Bardhi 2015). Moreover, 'on-demand renters' are characterized by 'companies which enable a temporary transaction of new assets' (Trabucchi et al. 2019, p. 1007). These approaches present an innovative version of the traditional renting business model where the companies provide a platform that offers direct access to shared assets (B2C, C2C), without any human intermediaries (Trabucchi et al. 2019). The literature on SE is growing but has a strong bias towards cities and metropolitan regions. More knowledge is needed about the development of the SE in peripheral areas (Agarwal & Steinmetz 2019).

With this backdrop there is a need for more knowledge about what people are willing to share and with whom, and how the use of technology can affect the NBT experiences. Findings from Iversen and Hem (2018) and Fredman & Margaryan (2020) underpin these knowledge gaps. To fill these gaps, the purpose of this article is to investigate attitudes towards sharing of gear (including clothes) among tourists doing NBT in Norway, aiming to increase our knowledge about NBT in the context of sharing economy and to contribute to the knowledge gap about sharing economy in general and in peripheral areas in particular.

**Method and data collection**

'The sharing economy, digital service innovation and restructuring of Innlandet: an analysis of the potential in the visitor industry and creative services' (CreaTur) is a R&D-project funded by the Regional Research Fund Inland. The project examines the development of the SE in the county of Innlandet in Norway, with a focus on factors preventing and promoting such development in a peripheral context. The project is limited to the tourism industry and aims to identify the potential the SE represents for this industry.

A survey has been conducted as an exploratory study within the R&D-project CreaTur. One aim of the survey was to identify attitudes towards sharing gear. Data was collected through a structured questionnaire. The survey covered a range of questions including background characteristics, attitudes toward borrowing and sharing gear, types of gear shared, and from whom or where the gear was shared/borrowed, and optimal timing for access to such gear. In addition, the respondents were asked about their last nature-based experience, the travel companion(s), means of transportation, and the use of sharing apps.

To trigger self-recruitment, the project partners spread the survey using different digital platforms, like homepages and social media (Facebook and Instagram). An obvious disadvantage of this method is the lack of control with population and respondents, and one must assume that only the most committed chose to respond. On the other hand, one may also assume that committed persons have extended experience with nature-based activities and knowledge of gear requirements. 523 respondents answered the survey, which will be supplemented with in-depth-interviews (in progress).

**Preliminary findings**

Preliminary findings suggest that about 80 % of the respondents would like to share gear if possible, and (a bit surprising) about 70 % states that the Covid-19-pandemic do not affect their attitude toward sharing. The findings also suggest that older respondents are more reluctant to share gear (figure 1). Important arguments for sharing gear are related to environmental and economic benefits. The findings indicate no difference in whether the respondents live in an urban or in a rural environment when it comes to attitude towards sharing. Looking into how the respondents get access to the equipment, common access is through commercial renting services, like hiring skies at a ski resort. The data indicates little sharing between strangers. More common is accessing gear through family.

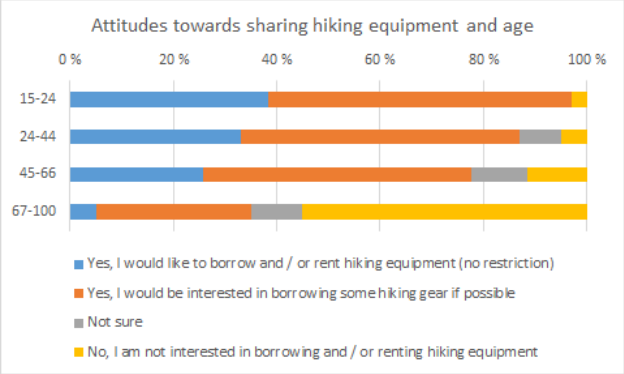


*Figure 1. Attitudes towards sharing gear. Age groups. n=523*.
Source: Survey, CreaTur. 2020.

Preliminary results indicate that there is an underutilized potential in the market. About 80 % of the respondents are positive towards sharing gear. Identified barriers are (among others) easy access to the gear and safety precautions like assurance that the equipment is available as planned and personalized. Confidence that the gear is maintained and in good condition is important among users. These preliminary findings favor actors who have (or have the opportunity to have) access to a large supply of gear, indicating B2C-sharing as a model to meet the demand for gear with C2C-sharing as a supplement in the market.

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# 46 The sharing economy in the context of outdoor recreation and nature-based tourism in Innlandet County, Norway

**Eivind Farstad**, **Jan Vidar Haukeland**, Institute of Transport Economics - Norwegian Centre for Transport Research, Norway

**Background**

The sharing economy (SE) refers to an economic model defined as a peer-to-peer based activity of acquiring, providing, or sharing access to goods and services that is often facilitated by a community-based on-line platform (Ranjbari et al., 2018).

SE is growing rapidly, and it is assumed that both new business models and new products based on digital sharing platforms can provide more efficient resource use through increased competition and innovation (NOU 2017:4). Thus, the paper addresses the future role and potentials of SE in the context of outdoor recreation and nature-based regional tourism in Innlandet County, Norway. SE research has so far been mainly concentrated within urban contexts, whereas there is a shortage of apposite studies connected to sparsely populated regions in general and to outdoor recreation/ nature-based tourism in particular. Opportunities of the SE in rural areas lie in e.g., provision of shared mobility, accommodations, food, specialized tools and equipment, and personal services such as guiding, courses, and other skilled human resources; needed for recreational stays and activities in nature areas; and availing prosumtion of nature-based assets. SE can be particularly viable in nature areas where such resources may be scarce, or where traditional commercial establishment may not be sustainable.

**Problem statement**

Given these developments, our main question is: what are considered, among the various stakeholders, to be the prospective benefits and obstacles potentially derived from SE in these sectors in this particular region towards 2030?


*Figure 1.* Innlandet County, Norway

Based on the perspectives of regional planners, local business actors, and NGOs in Innlandet, we identify plausible future scenarios and how such general developments will tend to affect the conditions for sharing of physical products and services within the sectors in question. In addition, we aim to identify the necessary measures to be employed to effectively support SE and fulfill its potentials.

**Megatrends and scenarios**

A megatrend is a comprehensive societal change that influences many aspects of society and has long-lasting effects. Megatrends also affect outdoor recreationalists' propensity to share equipment and services related to their activities. The understanding of megatrends is thus a useful analytical backdrop for our understanding of the driving forces that make future scenarios probable. Megatrend-derived scenarios can serve to describe and inform users about situations and conditions that, with a certain degree of credibility, can be expected to occur in the future (Moriarty, 2012), and as fairly plausible descriptions of an upcoming state e.g., in a 10-year perspective. Scenarios make reflections "outside the box" possible, i.e., they open for discussions of factors that can

affect the future without being "stuck" in the perspectives of the present. Thus, consequences, solutions and measures that are relevant to conceivable developments become more feasible.

**Mixed-method approach**

Our method is based on a combination of a qualitative with a more structured quantitative approach. At the outset, the researcher team organized a one-day online Scenario workshop in November 2020 among specially invited key stakeholders located in Innlandet. The stakeholders comprised public and private interests in relevant sectors. Three scenarios were presented to the participants by means of narratives prepared by the chairing researchers, and then discussed in separate breakout groups. The dialogues in the following plenary sections concluded, supported by the use of instant polls, with two of them being appraised as the most plausible ones in Innlandet. Attending stakeholders were invited to discuss and assess to what degree the identified scenarios would lead to more sharing of products and services; name the consequences for consumers, tourism industry, public authorities/ community/ larger society, and natural resources/ climate; and finally, identify which measures should be prioritized to fulfill the SE potentials of the most probable scenario.

Based on these outputs from the scenario workshop, a follow-up internet-based Delphi study will be organized and presented to a wider audience of knowledgeable stakeholders in Innlandet. The Delphi method is considered appropriate in analyzing problems involving uncertainty, such as future studies, and has previously been used in studies of ecotourism (Donohoe, 2011) and prospects for nature-based tourism (Konu, 2015; Haukeland et al., 2021). The Delphi method is a structured communication technique that includes opinions from experts in two or more consecutive questionnaires with controlled feedback. In our case, the Delphi study consists of two rounds probing beliefs regarding general pros and cons of SE, the likelihood of the two selected workshop scenarios, their potential consequences including climate and sustainability issues, and the associated measures they will require.

**Preliminary empirical findings**

The initial workshop identified, firstly, the accelerated technological developments, and secondly, the climate changes, as the two most credible scenarios. The technological innovations include expansions of the platform economy and possibilities for marketing and controlling shared assets and offering personal services remotely online, while climate change includes the greening of production and consumption patterns of our societies, among other aspects.

The Scenario workshop attendants expected the technological development to lead to more sharing of products and services and, moreover, to have positive impacts on consumer choices, create opportunities for local businesses, and to be beneficial for local communities. Also, the piloting, support and implementation of pioneering socio-technological solutions were considered helpful to sustain natural resources and climate.

The follow-up Delphi study, which comprises assessments of the two abovementioned scenarios and their implications, is being conducted in the spring 2021. The results of this two-staged inquiry will be presented at MMV10.

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# 76 Customer-focused drivers in the sharing economy: A meta-analysis

**Esra Aslan[1]**, **Leif Egil Hem[1]**, **Nina Iversen[2]**, [1]Norges Handelshøyskole, Norway. [2]Samfunns- og næringslivsforskning (SNF), Norway

## Introduction

Kotler (1972) defines marketing as "the set of human activities directed at facilitating and consummating exchanges" (p.12). Ordinarily, these exchanges are associated with permanent ownership between buyers and sellers. However, the advances of the internet and mobile technology have enabled buyers and sellers to exchange offerings that exponentially contribute to temporary access rather than ownership — as such, sharing as a form of consumption begin to emerge and numerous practices coined under this umbrella term. At the core, the phenomenon includes a variety of different products and services such as lodging (e.g., Airbnb), tools (e.g., ShareGrid), transportation (e.g., Uber), workspace (e.g., WeWork), or food services (e.g., Deliveroo).

The term of the "Sharing Economy" was first mentioned in 2008 and defined as the "collaborative consumption made by the activities of sharing, exchanging, and rental of resources without owning the goods" (Lessig 2008, p.143). After that, this phenomenon, or aspects of it, has been given many different names, including "collaborative consumption", "commercial sharing systems" (and "access-based consumption", "shared consumption", "on-demand economy", "collaborative economy", "platform economy" and "gig economy". Many of these terms share similar set of characteristics, yet, the definition articulates the entire set of characteristics formed by Eckhardt et al. (2019), who define the sharing economy as "a scalable socio-economic system that employs technology-enabled platforms to provide users with temporary access to tangible and intangible resources that may be crowdsourced" (Eckhardt et al., 2019 p.7).

The interest in participating in sharing systems is generally characterized as prosocial or sustainable behavior such as sharing, helping others, taking care of the environment. However, participating in sharing systems can also bring economic benefits like saving money or facilitating access to resources, which can form more individualistic reasons for participating in sharing economy practices. Previous research has shown that monetary motivations, environmental and societal concerns, flexibility, variety seeking, sustainability, community belonging, enjoyment and trust are among several factors that enhance participation in the sharing economy.

Although there is growing attention for research on consumer behaviour in the sharing economy, the findings regarding antecedents and outcomes of participating in these services are scattered and contradicting with previous findings. The existing literature offers broad range of antecedents for sharing economy; however, researchers disagree on which one best captures the value. Albeit little amount of literature reviews has been added to the field, and a quantifiable estimation of the relationship between the antecedents and outcomes has not been investigated yet. The inconsistency of previous research supports the need for meta-analysis to integrate the accumulated empirical research, to see the landscape of the research area, and provide comprehensive understanding on which antecedents are the most effective for sharing services. Based on these grounds, the paper aims to answer the research question:

*What are the main customer-focused antecedents of the sharing economy and to what extend do these antecedents influence the behavioural intention towards the sharing economy services?*

## Methodology

The goal of this study is a research synthesis. The research synthesis is referred as "the conjunction of a particular set of literature review characteristics" (Cooper, Hedges & Valentine, 2019, p.6). The main purpose of the research synthesis is integrating the empirical research to build generalizations. The term meta-analysis is often referred as research synthesis (Cooper et al., 2019). However, meta-analysis differs from research synthesis such that, it adds the quantitative procedures in synthesis.

Rosenthal & DiMatteo (2001) emphasize that "meta-analysis is more than a statistical

technique, it is a methodology for systematically examining a body of research, carefully formulating hypotheses, conducting an exhaustive research, establishing inclusion/exclusion criteria for articles, recording and statistically synthesizing and combining data and effect sizes from these studies, searching for moderator and mediator variables to explain effects of interest, and reporting results" (p.62). Albeit meta-analysis has the same aim with narrative literature and systematic literature review, many limitations of these studies can be addressed by employing statistical methods to integrate the findings of previous research.

Several steps are followed for conducting a meta-analysis. First, electronic search engines and database EBSCO Host is searched and nonredundant articles are noted. To retrieve all the relevant articles, the articles that used the terms of "sharing economy", "collaborative consumption", "commercial sharing systems", "access based consumption", "shared consumption", "peer to peer sharing economy", "on-demand economy", "collaborative economy", "platform economy" and "gig economy" are searched in the database, which were published between 2008 and 2021. In addition, references of the articles which found through databases as well as other main papers were examined to analyse articles that were not found by the database search. These articles also included in the analysis if they satisfy the inclusion criteria.

To be included in the meta-analysis, a study must measure the relationship between consumer-focused antecedents and behavioural intention towards sharing services with similar operationalizations. A construct is included in the conceptual framework only if at least 3 effects emerge to support its empirical analysis. The consumer related antecedents did not have to be named or regarded as antecedents, if the study measured the relationship in the sharing economy and a construct related to consumer-focused antecedents, it was included.
To avoid double counting (i.e., to maintain sample independence), if different studies used the same dataset and reported same correlations and there is no clear distinct outcome between studies, then they are excluded from the study.

**Findings**

Initial research in EBSCHO Host yielded 832 articles and references of the articles which found through databases generated additional 219 articles. Currently, 1051 abstracts and 141 articles reviewed and 75 of them were found relevant for meta-analysis. In the light of initial research, behavioural intention toward sharing services is mainly associated with financial (i.e., cost saving), environmental (i.e., sustainability), social (i.e., social experience) drivers. Moreover, trust, materialism, convenience, variety seeking, familiarity, enjoyment and reputation are among the important antecedents and prerequisites for sharing service usage intentions. Overall, the initial analysis supports that wide variety of antecedents involved in the formation of behavioural intention towards sharing services.

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# 22 Actor role-resource interactions in emerging sharing-economy businesses: A case study from Danish sharing-economy entrepreneurs

**Susanne Gretzinger**[1], **Birgit Leick**[2], **Anna Marie Dyhr Ulrich**[1], Mehtap Aldogan Eklund[3], [1]University of Southern Denmark, Department of Entrepreneurship and Relationship Management, Denmark. [2]University of South-Eastern Norway, School of Business, Department of Business and IT, Campus Bø, Norway. [3]University of Wisconsin-LaCrosse, College of Business Administration, USA

**Former abstract**

This paper explores the process of establishing and developing businesses within the sharing economy by assuming that actors, resources and activities jointly shape various roles associated with sharing-economy entrepreneurship within platform ecosystems over time. Starting from the dyadic level of analysis, a sample of 15 aspiring entrepreneurs as well as up-stream/down-stream actors related with the entrepreneurs (n= 45 interviews scheduled) in the country-case of Denmark will be sampled to investigate this research question. In the paper, we will describe actor-individual roles as well as business-oriented roles on the dyadic and the network level during the process of establishing, consolidating and stabilising shared-economy businesses. In addition, the drivers that enable these processes will be identified. This short paper provides an overview of the theoretical framework and the planned research design for the empirical study.

The paper will be positioned in the wider field of industrial/B2B marketing, but we will also provide the research and policy implications of this paper for regional economic development. While the large sharing-economy providers, such as Airbnb, Uber, and Kickstarter (to name just the most prominent ones), all represent successful cases of entrepreneurship in the sharing economy that quickly expanded to global markets, the extant literature pays much less attention to local niche-based entrepreneurs in the sharing economy outside these main roads. These local or regional cases that may be grow into national players (such as the example of Nabobil.no illustrates) can be found in various sectors, for instance, retail trade, tourism, food economies, the lodging industries and accommodation, but also farming and the cultural and creative industries. From a policy perspective, such regional entrepreneurs that use peer-to-peer interaction in the sharing economy and develop or apply digital technologies are important to revitalise and stabilise regional economies. In the light of this observation, our paper will conclude by summarising how the sharing-economy entrepreneurs can fulfil various and different roles in order to support local economic development with their entrepreneurship.

**This paper is work-in-progress, but based on previous research**

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# List of Participants

| *Name* | *Institution* | *Country* |
|---|---|---|
| **Abrahamsson, Oskar** | University of Gothenburg | Sweden |
| **Aikoh, Tetsuya** | Hokkaido University | Japan |
| **Akurugoda, Indi** | University of Ruhuna | Sri Lanka |
| **Ancin-Murguzur, Francisco Javier** | UiT The Arctic University of Norway | Norway |
| **Andrew, Ross** | West Virginia University | United States |
| **Ankre, Rosemarie** | Mid Sweden University/ETOUR | Sweden |
| **Arabi-Onnela, Marika** | Réseau des Grands Sites de France / Great Sites of France Network | France |
| **Arnberger, Arne** | University of Natural Resources and Life Sciences Vienna | Austria |
| **Arnegger, Julius** | West Coast University of Applied Sciences (FH Westkueste) | Germany |
| **Aslan, Esra** | Norges Handelshøyskole | Norway |
| **Balochini, Vanessa** | UNIRIO | Brazil |
| **Barioni, Debora** | Global Footprint Network | Italy |
| **Barros, Diana Carolina** | Universidad Complutense de Madrid | Spain |
| **Beckett, Natalie** | IUCN Med | Spain |
| **Beekhoven, Jasper** | Recreatie Noord Holland | Netherlands |
| **Benonisen, Rune** | Reisa np styre | Norway |
| **Berg, Nils-Yngve** | Miljødirektoratet/Norwegian Environment Agency | Norway |
| **Berge, Torill Brandal** | Norwegian University of Life Sciences | Norway |
| **Bhadury, Maya** | UC Davis | USA |
| **Bhatt, Pragya** | Griffith University | Nepal |
| **Bihunova, Maria** | Slovak University of Agriculture in Nitra | Slovakia |
| **Billet, Benjamin** | French Ministry of Sport - National resource center outdoor sports | France |
| **Bjarnadottir, Snædis L.** | Nærøyfjorden World Heritage Park | Norway |
| **Bjurstedt, Carl S.** | Dovrefjell National Park Board | Norway |
| **Bjørnstad, Kristian** | Norwegian Parks Association | Norway |
| **Bleines, David** | Natural Resources Wales | Wales |
| **Blye, Clara-Jane** | University of Albera | Canada |
| **Blyth, Samuel** | Uppsala University | Sweden |
| **Boldt, Andreas** | Pro Natura Switzerland | Sitzerland |
| **Borgström, Sara** | Dept of Sustainable Development, Environmental Science and Engineering (SEED), KTH | Sweden |
| **Botelho, Andrea Z.** | University of the Azores / CIBIO | Portugal |
| **Brandenburg, Christiane** | University of Natural Resources and Life Sciences, Vienna | Austria |

| | | |
|---|---|---|
| **Bredeweg, Evan** | Oregon State University | USA |
| **Breiby, Monica** | Inland Norway University of Applied Sciences | Norway |
| **Breyne, Johanna** | Gembloux | BELGIUM |
| **Burns, Georgette Leah** | Griffith University | Australia |
| **Burns, Robert** | West Virginia University | United States |
| **Bussard, Jonathan** | Institute of Geography and Sustainability, University of Lausanne | Switzerland |
| **Cajiao, Daniela** | Universidad Autónoma de Madrid | Ecuador |
| **Campbell, Michael** | University of Manitoba | Canada |
| **Carvalho, Rui Miguel** | - | Portugal |
| **Chekalina, Tatiana** | Mid Sweden University | Sweden |
| **Christensen, Haaken** | Innovasjon Norge | Norway |
| **Clemetsen, Morten** | Norwegian University of Life Sciences | Norway |
| **Cline, Sarah** | USDA Forest Service | USA |
| **Clivaz, Christophe** | University of Lausanne, Institute of geography and sustainability | Switzerland |
| **Conti, Eugenio** | Dalarna University - Mid Sweden University | Sweden |
| **Corrigan, Katherine** | University of Alberta | Canada |
| **Creany, Noah** | Utah State University | United States |
| **Crowley, Christian** | US Department of the Interior | USA |
| **Dagan, Dani** | Clemson University | USA |
| **Dahl, Ingrid** | Norwegian Environment Agency | Norway |
| **Dahlberg, Annika** | Dept of Physical Geography, Stockholm university | Sweden |
| **Dalley, Jeff** | New Zealand Department of Conservation | New Zealand |
| **D'antonio, Ashley** | Oregon State University | USA |
| **De Bie, Kelly** | Parks Victoria | Australia |
| **De Jong, I.** | Natuurmonumenten | The Netherlands |
| **Dehez, Jeoffrey** | French National Research Institute for Agriculture, Food and Environment (INRAE) | FRANCE |
| **Deng, Jinyang** | West Virginia University | USA |
| **Derek, Marta** | University of Warsaw | Poland |
| **Diehl, Lisa** | Swedish Environmental Protection Agency | Sweden |
| **Doñoro Moya, Marta** | Consorci del Parc Natural de la Serra de Collserola | Espanya |
| **Dorado, Víctor** | National Institute of Physical Education of Catalonia (INEFC). University of Lleida. | Spain |
| **Dybedal, Petter** | Institute of Transport Economics | Norway |
| **Dybsand, Hilde Nikoline Hambro** | Norwegian University of Life Sciences | Norway |
| **Dåsnes, Morten** | Friluftsrådenes Landsforbund | Norway |

| | | |
|---|---|---|
| **English, Donald** | USDA Forest Service | USA |
| **Engström, Johan** | Visit Dalarna AB | Sweden |
| **Esselström, Jean** | Länsstyrelsen Västernorrland | SWEDEN |
| **Evju, Marianne** | Norwegian Institute for Nature Research | Norway |
| **Ewertowski, Marek** | Adam Mickiewicz University | Poland |
| **Fagerholm, Nora** | University of Turku, Department of Geography and Geology | Finland |
| **Falk, Martin** | University of South Eastern Norway | Norway |
| **Farías Torbidoni, Estela Inés** | National Institute of Physical Education of Catalonia (INEFC). University of Lleida | Spain |
| **Farstad, Eivind** | Transportøkonomisk institutt | Norway |
| **Feddersen, Hilke** | Naturpark Lueneburger Heide | Germany |
| **Fennell, David** | Brock University | Canada |
| **Fish, Thomas** | US DOI / CESU Network | USA |
| **Fjelltun-Larsen, Ole Kristian** | Haukland Eiendomsutvikling AS | Norway |
| **Folmer, Akke** | NHL Stenden | The Netherlands |
| **Forbord, Magnar** | Ruralis - Institute for Rural and Regional Research | Norway |
| **Forsberg, Oskar** | The Swedish Forest Agency | Sweden |
| **Fossum, Knut** | Miljødirektoratet | Norge |
| **Fredman, Peter** | Norwegian University of Life Sciences | Norway |
| **Fuchs, Matthias** | Mid-Sweden University | Sweden |
| **Fulton, Samantha** | University of Canterbury | New Zealand |
| **Garms, Mareike** | Blach Forest National Park | Germany |
| **Gentin, Sandra** | University of Copenhagen, Department of Geosciences and Natural Resource Management | Denmark |
| **Gjesdal, Ove** | Visit Lillehammer | Norway |
| **Gloaguen, Maïwenn** | Eco-Compteur | France |
| **Godtman Kling, Kristin** | Mid Sweden University/ETOUR | Sweden |
| **Godwin, Danielle** | Murdock University | Australia |
| **Gona, Judy Kehper** | Sustainable Travel and Tourism Agenda | Kenya |
| **Goossen, Martin** | Wageningen Environmental Research | Netherlands |
| **Gruas, Léna** | EDYTEM - Université Savoie Mont Blanc | France |
| **Guennoc, Laurent** | Eco-Counter | France |
| **Gundersen, Vegard** | Norwegian Institute for Nature Research | Norway |
| **Gunnarsdóttir, Guðrún Þóra** | Icelandic Tourism Research Institute | Iceland |
| **Hallberg, Daniel** | Kristianstad University | Sweden |
| **Halpenny, Elizabeth** | University of Alberta | Canada |
| **Hansen, Andreas Skriver** | University of Gothenburg | Sweden |
| **Hartje, Volkmar** | Technische Universitaet Berlin | Germany |

| | | |
|---|---|---|
| **Haughey, Kay** | Department of Conservation | New Zealand |
| **Haukeland, Jan** | Institute of Transport Economics | Norway |
| **Hausner, Vera** | UiT The Arctic University of Norway | Norway |
| **Hegmann, Sylvanna** | Parks Canada Agency | Canada |
| **Heikinheimo, Vuokko** | Finnish Environment Institute SYKE | Finland |
| **Heinmaa, Lagle** | State Forest Management Centre (RMK) | Estonia |
| **Helgadóttir, Guðrún** | USN School of Business, Department of Business and IT | Norway |
| **Helle, Astri Merethe** | | Norway |
| **Herz, Marc** | Kleinundpläcking GmbH | Germany |
| **Higham, James** | University of Otago | New Zealand |
| **Hjelm, Rúna** | - | Faroe Island |
| **Hochreutener, Adrian** | Institute of Natural Resource Sciences, ZHAW - Zurich University of Applied Sciences | Switzerland |
| **Hov-Gylthe, Tina Rebecca** | The Research Council of Norway | Norway |
| **Hunziker, Marcel** | Swiss Federal Institute for Forest, Snow and Landscape Research | Switzerland |
| **Hurtado, Melissa** | West Virginia University | United States |
| **Hutton, Elina** | University of Lapland | Finland |
| **Hvenegaard, Glen** | University of Alberta | Canada |
| **Hämäläinen, Juuso** | Uuvi / Helsinki-Uusimaa Outdoors | Finland |
| **Hårstad, Martine** | Rondane-Dovre nasjonalparkstyre og Dovrefjell nasjonalparkstyre | Norge |
| **Irwin, Joel** | Griffith University | Australia |
| **Jacobsen, Troels** | AECO- Association of Arctic Expedition Cruise Operators | Norway |
| **Jacquart, Natacha** | University of Lausanne - Bramois Institut of Gerography and durability | Switzerland |
| **Jensen, Frank Søndergaard** | University of Copenhagen | Denmark |
| **Jenssen, Bjørn Åge** | National Park Municipalities of Norway | NORWAY |
| **Johansen, Roger** | NordNorsk Reiseliv AS | Norway |
| **Johnsgård Nygaard, Vilde** | Norwegian University of Life Sciences | Norge |
| **Jungmeier, Michael** | Fachhochschule Kärnten gemeinnützige Privatstiftung | Austria |
| **Jørgensen, Frigg** | AECO - Association of Arctic Expedition Cruise Operators | Norway |
| **Kajala, Liisa** | Metsähallitus, Parks & Wildlife Finland | Finland |
| **Kajikawa, Masahiro** | Nagoya University | Japan |
| **Karkola, Venla** | Metsähallitus, Parks & Wildlife Finland | Finland |
| **Karlsdóttir, Berglind** | Forest Research | United Kingdom |
| **Karlsson, Ulrika** | Naturvårdsverket | Sverige |
| **Karoles-Viia, Kerli** | State Forest Management Centre (RMK) | Estonia |
| **Keller, Rose** | Norsk Institut for Naturforskning | Norway |

| | | |
|---|---|---|
| **Ketterer Bonnelame, Lea** | Eastern Switzerland University of Applied Sciences Rapperswil | Switzerland |
| **Keyser, Margrete** | Svalbard Science Forum - Research Council of Norway | Norway |
| **Kim, Hyerin** | Hokkaido University | Japan |
| **Kim, Jin-Woo** | Yeungnam University | South Korea |
| **Kobayashi, Yusuke** | Hokkaido University | Japan |
| **Kohori, Takako** | The University of Tokyo | Japan |
| **Konu, Henna** | Natural Resources Institute Finland | Finland |
| **Koopman, José** | Natuurmonumenten | The Netherlands |
| **Kurita, Kazuya** | Tokyo University of Agriculture | Japan |
| **Kvalshaug, Ole-Jakob** | Lofotodden National Park | Norway |
| **Kvalsvik, Ellen-Johanne** | UiT Arctic University of Norway | Norway |
| **Kvamme, Stine** | Inland Norway University of Applied Sciences | Norway |
| **Kyle, Gerard** | Texas A&M University | USA |
| **Labbé, Delphine** | Univeristy of Illinois in Chicago, University of British Columbia, Simon Fraser University | United States |
| **Laukkanen, Mari** | Metsähallitus Parks & Wildlife Finland | Finland |
| **Lee, Ju Hyoung** | Yeungnam Uuniversity | South Korea |
| **Lehto, Carl** | Departmend of Ecology | Sweden |
| **Leick, Birgit** | University of South-Eastern Norway, School of Business, Department of Business and IT | Norway |
| **Lein, Berit** | Norwegian Environment Agency | Norway |
| **Lemmen, Marieke** | West Virginia University | United States |
| **Lepikkö, Tapio** | Uuvi / Helsinki-Uusimaa Outdoors | Finland |
| **Lerfald, Merethe** | Inland Norway University of Applied Sciences | Norway |
| **Leung, Yu-Fai** | North Carolina State University | USA |
| **Li, Chieh-Lu** | National Dong Hwa University | Taiwan |
| **Lia, Emmi** | University Of Washington | United States |
| **Lier, Marie** | Miljødirektoratet | Norway |
| **Lindberg, Kreg** | Oregon State University | USA |
| **Liu, Yu** | University of Copenhagen | Denmark |
| **Livina, Agita** | Vidzeme University of Applied Sciences | Latvia |
| **Lund-Mikkelson, Margit** | UiT | Norway |
| **Lykkja, Hanne** | Nordland fylkeskommune | Norway |
| **Løseth, Kristin** | Western Norway University of applied sciences | Norway |
| **Magro Lindenkamp, Teresa C** | University of Sao Paulo | Brasil |
| **Mangachena, Joy** | Griffith University | South Africa |
| **Maran, Kaidi** | State Forest Management Centre (RMK) | Estonia |
| **Marin, Magnus** | Stiftelsen Tyrestaskogen | Sweden |

| | | |
|---|---|---|
| **Mathiesen, Kristin** | Inland Norway University of Applied Sciences | Norway |
| **Matsuba, Misako** | National Institute for Environmental Studies | Japan |
| **Mayer, Marius** | University Innsbruck | Austria |
| **Mcmahon, Keri** | Parks Canada Agency | Canada |
| **Meijles, Erik** | Rijksuniversiteit Groningen | Netherlands |
| **Mezgaile (Ex. Arklina), Anda** | Vidzeme University of Applied Sciences | Latvia |
| **Miller, Anna** | Utah State University | USA |
| **Molin, Lovisa Ulrica** | Norwegian University of Life Sciences | Norway |
| **Monz, Chris** | Utah State University | USA |
| **Moore, Kevin** | South African National Parks | South Africa |
| **Moreira, Jasmine** | Ponta Grossa State University | Brazil |
| **Moseng Sivertsvik, Rita** | Ruralis - Institute for Rural and Regional Research | Norway |
| **Moya Caldserón, Michael** | Autonomous University of Barcelona | Spain |
| **Mucha, Debbie** | Provincial Government | Canada |
| **Muehling, Nora** | Mountain Bike Tourism Forum Germany | Germany |
| **Muhar, Andreas** | BOKU University of Natural Resources and Life Sciences Vienna | Austria |
| **Muñoz, Lorena** | UiT | Norway |
| **Mykletun, Reidar J.** | University of Stavanger | Norway |
| **Nantel, Alain** | Parks Canada Agency | Canada |
| **Neuvonen, Marjo** | Natural Resources Institute Finland (Luke) | Finland |
| **Nielsen, Maya** | Visit Fredrikstad & Hvaler | Norway |
| **Nogueira Mendes, Ricardo M.** | CICS.NOVA, Universidade Nova de Lisboa - NOVA FCSH / INEFC-UdL | Portugal |
| **Nowak, Marie** | Dalarna University | Stockholm |
| **Näsström, Camilla** | Swedish Environmental Protection Agency | Sweden |
| **Ollila, Erkki** | Metsähallitus Parks & Wildlife Finland | Finland |
| **Olsen, Sigve** | Vestvågøy kommune | Norway |
| **Oma, Peter** | Norsk Friluftsliv | Norway |
| **Pálsdóttir, Anna María** | People and Society | Sweden |
| **Pereira Da Silva, Carlos** | CICS.NOVA, Universidade Nova de Lisboa - NOVA FCSH | Portugal |
| **Pickering, Catherine** | Griffith University | Australia |
| **Piotrowski, Krzysztof** | Adam Mickiewicz University in Poznan | Poland |
| **Pitkänen, Kati** | Finnish Environment Institute SYKE | Finland |
| **Porst, Florian** | Bavarian Forest National Park Administration | Germany |
| **Pouwels, Rogier** | Wageningen Environmental Research, | The Nether-lands |
| **Prescott, Mike** | Laval University | Canada |
| **Præstholm, Søren** | University of Copenhagen | Denmark |
| **Pröbstl-Haider, Ulrike** | University of natural resources and life sciences, Vienna | Austria |

| | | |
|---|---|---|
| **Puhakka, Riikka** | University of Helsinki | Finland |
| **Radakovitz, Kerstin** | University of Natural Resources and Life Sciences Vienna | Austria |
| **Rasmussen, Ingunn** | Holmen Lofoten AS | Norway |
| **Reiko, Machida** | Tokyo University of Agriculture | Japan |
| **Rettie, Kathy** | Mount Royal University | Canada |
| **Rice, William** | University of Montana | USA |
| **Rogowski, Mateusz** | Adam Mickiewicz University | Poland |
| **Rongved, Marta** | Hordaland county council | Norway |
| **Rose, Michelle** | Parks Victoria | Australia |
| **Rudshaug, Trym Holt** | Norwegian Parks Association | Norway |
| **Rupf, Reto** | Zurich University of Applied Sciences | Switzerland |
| **Sacher, Philipp** | University of Goettingen | Germany |
| **Saga, Ayami** | Hokkaido Development Engineering Center | Japan |
| **Sagheim, Kristine Blekastad** | Inland Norway University of Applied Sciences | Norway |
| **Salak, Boris** | Swiss Federal Institute for Forest, Snow and Landscape Research (WSL) | Switzerland |
| **Sallamaa, Silva** | Uuvi / Helsinki-Uusimaa Outdoors | Finland |
| **Schmidt, Ronald** | Wildnispark zürich | Switzerland |
| **Schulz, Leonie** | University of the Highlands & Islands | Scotland, UK |
| **Schwarzmann, Danielle** | Office of National Marine Sanctuaries | USA |
| **Schägner, Jan Philipp** | JRC, Eueropean Commission | Italy |
| **Selin, Steven** | West Virginia University | USA |
| **Selnes, Terje** | Park och naturförvaltningen Göteborg Stad | Sweden |
| **Selvaag, Sofie** | Norwegian Institute for Nature Research | Norway |
| **Shimazaki, Yoshiaki** | Akita Prefectural University | Japan |
| **Sidder, Susan** | Oregon State University | USA |
| **Siegrist, Dominik** | Eastern Switzerland University of Applied Sciences Rapperswil | Switzerland |
| **Singsaas, Marianne** | Telemark Research Institute | Norway |
| **Sisneros-Kidd, Abigail** | University of Wyoming | United States |
| **Sitarz, Magdalena** | Tatra National Park | Poland |
| **Skibins, Jeffrey** | East Carolina University | USA |
| **Skjerdal, Cecilie** | - | Norway |
| **Skov-Petersen, Hans** | University of Copenhagen | Denmark |
| **Slabbert, Liandi** | South African National Parks | South Africa |
| **Smedshaug, Erlend** | Klima- og miljødepartementet | Norge |
| **Smith-Christensen, Cecilie** | World Heritage Catalysis | Norway |
| **Solvang, Dag Terje K.** | Norwegian Tracking Organisation | Norway |

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|---|---|---|
| **Sorakunnas, Esko** | University of Eastern Finland | Finland |
| **Spenceley, Anna** | IUCN WCPA Tourism and Protected Areas Specialist Group | Papua New Guinea |
| **Spernbauer, Bettina** | Utah State University | USA |
| **Stahl Olafsson, Anton** | University of Copenhagen, Dep. of Geosciences and Natural Resource Management | Denmark |
| **Stav, Ingrid Vaagland** | Norwegian Environment Agency | Norway |
| **Steingass, Frank** | Nationalpark Harz | Germany |
| **Stemmer, Kathrin** | Norwegian University of Life Sciences | Norway |
| **Stighäll, Eva** | Naturvårdsverket | Sweden |
| **Stokke, Knut Bjørn** | Norwegian University of Life Sciences | Norway |
| **Stomperud, Maylinn** | Den Norske Turistforening / The Norwegian Trekking Association | Norway |
| **Strzelecka, Marianna** | Linaeus University | Sweden |
| **Sun, Yujie** | Hokkaido University | Japan |
| **Svensson, Gaute** | UiT | Norway |
| **Sæþórsdóttir, Anna Dóra** | University of Iceland | Iceland |
| **Sørnes, Ingunn** | Innovation Norway | Norway |
| **Taczanowska, Karolina** | University of Natural Resources and Life Sciences (BOKU) | Austria |
| **Talsnes, Hege** | Norwegian Environment Agency | Norway |
| **Tapaninen, Matti** | Metsähallitus, Parks & Wildlife Finland | Finland |
| **Teixidor, Arnau** | IUCN Med | Spain |
| **Teles Da Mota, Vanessa** | Griffith University | Australia |
| **Thøgersen, Anna Schouboe** | Naturstyrelsen | Danmark |
| **Toivonen, Tuulit** | University of Helsinki | Finland |
| **Tomczyk, Aleksandra** | Adam Mickiewicz University | Poland |
| **Torres, Paulo** | University of the Azores / CIBIO | Portugal |
| **Tveit Sjøberg, Mona** | NMBU | Norway |
| **Tverijonaite, Edita** | University of Iceland | Iceland |
| **Tyrväinen, Liisa** | National Resources Institute Finland | Finland |
| **Tærum, Eli Ragna** | The Research Council of Norway | Norway |
| **Valan, Sindre** | National Park Board for Femundsmarka and Gutulia | Norway |
| **Van Den Berg, John** | - | Netherlands |
| **Van Den Heuvel, Lotte** | Uppsala University | Sweden |
| **Vejlens, Mattias** | County Administration Board of Gotland | Sweden |
| **Ventura, Maria A.** | University of the Azores / CIBIO | Portugal |
| **Virkkunen, Veikko** | Metsähallitus, Parks&Wildlife Finland | Finland |
| **Vitek, Ondrej** | Nature Conservation Agency of the Czech Republic | Czech Republic |
| **Vold, Thomas** | Norwegian School of Sports Sciences | Norway |

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|---|---|---|
| **Von Ruschkowski, Eick** | Alfred Toepfer Akademie für Naturschutz | Germany |
| **Vorkinn, Marit** | County Governor of Innlandet | Norway |
| **Vrsaljko, Andelko** | University of zadar | Croatia |
| **Väisänen, Tuomas** | University of Helsinki | Finland |
| **Wall-Reinius, Sandra** | Mid Sweden University/ETOUR | Sweden |
| **Wang, Ting** | Graduate School of Environmental Science, Hokkaido University | Japan |
| **Wennström, Carina** | Metsähallitus / Parks & Wildlife Finland | Finland |
| **White, Eric** | USDA Forest Service | USA |
| **Wigestrand, Ingrid Larsen** | Friluftsrådenes Landsforbund | Norway |
| **Wikberg, Per-Olov** | Naturvårdsverket | Sweden |
| **Wilkins, Emily** | Utah State University | United States |
| **Williams, Susan** | Natural Resources Wales | Wales |
| **Wolf, Isabelle** | The University of Wollongong | Australia |
| **Wood, Spencer** | University of Washington | USA |
| **Wunderlich, Anne** | Eidg. Forschungsanstalt für Wald, Schnee und Landschaft WSL | Switzerland |
| **Wyttenbach, Martin** | Zurich University of Applied Sciences | Switzerland |
| **Xie, Yefeng** | International Center for Recreation and Tourism Research, Peking University | China |
| **Zink, Julia** | Bavarian Forest National Park Administration | Germany |
| **Øian, Hogne** | Inland Norway University of Aplied Sciences | |
| **Övrelid, Åsa** | Tec | Sweden |
| **Aas, Øystein** | Norwegian University of Life Sciences | Norway |