CHANGES IN NATURE VISITATION AND THE POTENTIAL OF MOBILE BIG DATA FOR VISITOR MONITORING

Report of the MOBICON workshop held in Helsinki 28.9.2023



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Note 1. You can refer to this document as follows:

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Note 2. This document is available also in Finnish: https://doi.org/10.31885/2024.030502

1. Summary

The Changes in Nature Visitation and the Potential of Mobile Big Data for Visitor Monitoring workshop was held in Helsinki on 28.9.2023. We organized the workshop as part of the five-year MOBICON research project (*Mobile Big Data for Understanding People in Nature - Detecting short- and long-term changes and their implications for biodiversity conservation)* funded by Kone Foundation. The aim of the workshop was to collect expert opinions related to the changes in the recreational use of nature, the monitoring needs related to the changing visitations, and to discuss the possibilities of various new data sources to meet managerial information needs.

Eight experts from different organisations (Metsähallitus, City of Helsinki, Uusimaa Recreation Area Association Uuvi and Suomen Latu r.y.) participated in the event. Prior to the workshop, the participants had answered a survey about their experiences and information needs related to the changing visitations. The discussion progressed from the results of the survey to more in-depth discussions. Below we summarize the key results from the discussions.

The recreational use of nature was seen to be changing. Recreational use is increasing and its temporal rhythms are changing. At the same time, the visitor base becomes more diverse because of the general diversification of society and the fact that new user-groups have started to explore nature. Activities and ways of being in nature are also diversifying.

Approaching the changes through four megatrends (social, environmental, political and technological changes). The social and environmental drivers of change were seen as the most important. social changes were identified to be related to the ageing of the population and the diversification of nature visitors. Climate change, as an environmental factor, was identified as the most important driver of change, impacting both nature but also human behaviour. Among the political drivers of change, particularly the increasing polarisation of society emerged in the discussion. In addition, political decisions relating to everyone's rights, biodiversity protection and resources directed for the management of recreational areas were seen as important. Technological changes were identified as important and this change taking place as part of the broader technologization of society. On the one hand, this general technologization increases the opportunities for access to and sharing of information. On the other hand, the increased ‘measurement culture’ also affects the amounts of recreational use, as people are aiming to reach their kilometer or step targets.

The information needs of organisations were recognized to include 1) planning of management actions, 2) justifying one's own activities for securing funding and 3) informing visitors. Information is needed on visitor flows and their spatial and temporal distribution. In addition, information about the visitors themselves was considered necessary, especially as the visitor base is becoming more diverse. The workshop participants also expressed concern about those who do not visit recreational areas: how get more information about them and the factors that limit nature visits.

Collecting visitor data was seen as expensive and time-consuming, which is why finding new kinds of data sources has potential. Mobile data was evaluated as an interesting source of information and its various aspects were discussed through a SWOT analysis. However, it was clear that in operational use, information must be reliable and easily accessible and some doubts were raised on the potential of mobile big data from this aspect.

The event was organised by Aina Brias Guinart, Matti Hästbacka, Tatu Leppämäki, Jussi Torkko and Tuuli Toivonen. Johanna Eklund participated in the workshop from maternity leave. More information about the event or research can be found on the project's website or by e-mail to the

project's researchers: mobicon-project@helsinki.fi. The MOBICON project will operate from 2022 to 2026 and it is funded by Kone Foundation. Website: https://www.helsinki.fi/en/researchgroups/digital-geography-lab/projects/mobicon.

2. Objective and background of the workshop

The aim of the workshop was to map with experts 1) changes in the recreational use of nature, 2) the information needs in monitoring, and 3) to consider the possibilities of various new data sources to meet these information needs. The workshop is part of a series of three workshops in different countries. Other workshops will take place in Spain in the Canary Islands in spring 2024, and in sub-Saharan Africa (location still open) at the turn of the year 2024–2025.

The results of the workshops are reported independently both in workshop-specific reports (like this one for Helsinki/Finland) and in a scientific article. They outcomes are also used to guide subsequent scientific research to develop and help to operationalise the use of various data sources.

The workshops are part of the five-year MOBICON research project (*Mobile Big Data for Understanding People in Nature - Detecting short and long term changes and their implications for biodiversity conservation)* funded by Kone Foundation. The project's working group has previously published dozens of scientific articles on the utilisation of data produced by mobile applications in analyses of the recreational use of nature (e.g. Tenkanen et al. 2017, Toivonen et al. 2019, Heikinheimo et al. 2020) and produced information on the recreational use of nature in Finland (Heikinheimo et al. 2017, Väisänen et al. 2021) and elsewhere in the world (Hausmann et al. 2018, 2020). Now the aim is to consider the usability of mobile big data to support the operational planning and management of recreational use of nature.

3. Workshop description

The Changes in nature visitation and the potential of mobile big data for visitor monitoring-workshop was held in the Porthania building of the University of Helsinki on 28.9.2023 between 9.45-16.30. Eight experts from different organisations were present at the event: Matti Tapaninen, Erkki Ollila, Susanne Nylund, Carina Wennström, Linda Vanni (Metsähallitus, Parks & Wildlife Finland), Elina Nyberg, Taija Savolainen (City of Helsinki), Teemu Launio (Suomen Latu r.y.) and Sini Veuro (Uuvi Association, Helsinki-Uusimaa Outdoors).

The invitation to the workshop had been widely disseminated in stakeholder networks. The number of participants was somewhat reduced due to a discussion event organised simultaneously at the Ministry of the Environment.

The workshop participants had responded in advance to a questionnaire that mapped the participants' perceptions of the topics to be discussed in the workshop: changes in nature visits and drivers of change, as well as the visitor monitoring systems in use and expectations related to big data.

On the actual workshop day, the participants were divided into two small groups after a general workshop introduction. The workshop activities were carried out in these small groups. Before each task, the collective answers to the respective preliminary questionnaire question were presented as graphs to the participants (as shown in Appendix 1). During the morning hours, the discussion focused on the changes that have occurred and are anticipated during nature visits, as well as the impacts of these changes to the management of natural areas and nature conservation. The changes were discussed in light of major global megatrends (as presented by Buckley et al. 2015): Social changes, environmental changes, political changes, and technological changes. The discussions were

documented in notes taken by the notetaker. In addition, the participants used post-it notes to outline the interactions between the observed/anticipated changes and the factors affecting them. We reserved an hour for each of these broad discussion themes, with a short break in between.

After a common lunch break, the participants were divided into new groups and given the task of considering the use of technology in nature visitations, their own information needs, and the potential big data can have for monitoring the use of natural areas. A total of 1.5 hours had been reserved for this. After the actual workshop activities, the researchers presented their own results, and the participants were able to ask questions related to the topic. As the last task of the day, the participants filled in a SWOT matrix, considering the potential of big data in meeting the information needs of recreational use of nature.

4. Changes and factors of change in nature tourism

In the first part of the workshop, we asked participants to identify changes in nature tourism from the perspective of social, political, environmental and technological megatrends (Buckley et al. 2015). Below, we present the main findings.

4.1 Social factors

Social factors were seen as the most important drivers of change in nature tourism and thus for the management of natural areas. Among the significant societal trends, the participants discussed **the ageing and diversifying demographic structure, wealth and inequality, changes in working life and housing, and diverse activities in nature.** The impacts of these changes were considered multifaceted, and the participants identified both challenges and opportunities that emerge from the changing pool of nature visitors.

Older nature visitors may need more accessible routes, but on the other hand, they are not bound by the rhythms of work and school life, which means that they may balance out the visitor flows that otherwise is very condensed to the holiday seasons. The increase of visitors in **younger age groups** and with **varying cultural and national backgrounds** was discussed especially from the perspective of new communication and service needs: how to reach the new visitor groups, both the young and the “new finns”, serve them well and adapt possible new ways of being in nature to previous habits? Activities like mountain biking, stand-up paddleboarding, and autumn colour trips were seen as something popular in social media. New **activities in nature depicted in social media** may change nature visitation unexpectedly as new ideas spread quickly if going viral. This can cause surprising visitor pressure on new areas or around new activities. In addition, it was considered how to alleviate conflicts resulting from different activities – in other words, how to accommodate the needs and preferences of skiers, dog walkers and cyclists into the same nature areas. Potential conflicts between different user-groups risk being exacerbated by the increase in visitor numbers overall.

The discussants also identified that the rhythms of visits change over time. Nature trips is increasingly taking place during holidays due to the **demands of working life and the desertification of the countryside**, which reduces the number of local visitors during weekdays. On the other hand, these changes may be reversed by the increase **in remote work and second home living**. **The increase of wealth** affects not only the number of visitors, but also the equipment acquired for activities and recreation. Prosperity brings new groups of visitors to nature, and introduces new phenomena like the so-called glamping tourism, which requires completely new types of services. The participants were worried that enjoying nature would increasingly be dependent on wealth and put people in unequal positions.

4.2. Environmental factors

Of the environmental megatrends, **climate change** was clearly identified as the most important, and its effects on the recreational use of nature were widely recognized. In the discussions, it was highlighted as one of the most important factors influencing nature tourism and the recreational use of nature, and it was seen as "setting limits" for nature visits.

Climate change was considered to affect nature tourism and the recreational use of nature in many ways. **The impacts are both direct** (e.g., changes in local climatic conditions) **and indirect** (e.g., consequences of actions against climate change). Among the direct effects, the discussions highlighted the **impact of climate change on the length of the winter season and the amount of snow**, which was thought to reduce the number of ski tourists, in particular. However, the participants also identified other consequences of the direct effects of climate change on the recreational use of Finnish nature: if the climate becomes unpleasant or unfavourable elsewhere, people may travel from far away specifically in search of a more tolerable climate. In concrete terms, these changes could manifest themselves, for example, in changes in the temporal structures of nature tourism. On the other hand, it was seen that **the desire to limit one's own carbon emissions** may reduce tourism and emphasize the importance of local destinations and public transport connections in nature areas. Reduced tourism can have two effects: if people prefer local destinations, the pressure on regions may change, for example, when foreign tourism turns into domestic tourism.

It was also noted that climate change is likely to have a higher impact on nature conservation compared to the recreational use of nature.

4.3 Political factors

The participants felt that **finding a balance between nature conservation and recreational use** was a significant challenge. Solutions that are important for nature conservation often conflict with the recreational potential of areas. Organisations design their services based on their target visitor groups, but due to nature conservation regulations, they might have to compromise and leave good hiking areas undeveloped. The discussions revealed that **Finnish nature is also perceived as regionally divided**, with parts of the country seen as more suitable for recreational use, and other parts more seen as a resource production area.

The discussion revealed that **visitors act differently in nature based on their backgrounds**. Local residents, officials, visitors and paying visitors have different feeling of ownership of and attachment to natural sites, which in turn affects their activities. At the same time, decisions taken by the management organisations affect who visits the area. For example, accessibility and the possible (even voluntary) visitor fees on activities like hiking and skiing may impact who visits the areas. In decision-making, it was seen **challenging to determine who has decision-making power over nature**.

The conservation status of the area was seen to impact people's behaviour. Discussion participants felt that protected sites are seen differently from economic areas, and that the protection status puts pressure on visitors to operate in a more mindful manner.

Changes in the international political environment, such as the war in Ukraine or the absence of Russian tourists did not emerge as a significant factor in the discussion. On the other hand, **international conservation policy was seen important**: Nature conservation obligations will continue to guide recreational use also in the future. For example, the Kunming-Montreal Global Biodiversity Framework of the UN Convention on Biological Diversity obliges countries to protect

30% of the land and sea area by 2030. When demarcating new areas in Finland, the aim is to also promote opportunities for recreational use.

4.4 Technological factors

The discussion recognised **the importance of technological developments for nature tourism and society at large**: "Everything [in technology] is developing with an accelerating speed. [Recreation area managers] will need to think carefully what solutions to adopt. We will always have those who don't use [technology in nature] and those who use."

The role of technology was recognised as an important part of all stages of a nature visit. **Before visiting, more and more people search for information online**. In addition to the websites maintained by the responsible organizations, the visitors themselves share information through social media and other user-generated platforms. These **informal and user-generated information sources were seen to have a clear impact on visitor flows**. It was noted that special groups may benefit from this sharing of information (e.g. those with young children can learn from the experiences of other visitors with children), as official sources of information cannot contain targeted information to all user groups. On the other hand, social media influencers or challenge campaigns in social media may direct visitors to areas where they are not welcomed by the managers.

During nature visits, the use of technology has diversified. On one hand, **technology supports the search for essential and safety-related information**. For example, digital maps or weather forecasts are commonly used in places where there is access to electricity and internet. On the other hand**, sharing one's own experiences on social media or through sports applications has also increased**. In the discussions, this increased use of social media was spurring some controversy, as social media posts, in particular, sometimes direct people to unwanted areas and activities also spontaneously during the visit. The extensive use of technology was seen somewhat problematic as nature provides an opportunity to free oneself from technology, and the widespread use of social media while in nature can reduce the possibilities for this. **Sports applications** and general measuring of one's own activity and health were seen to increase physical activity in nature, although more from the perspective of sports than from the perspective of observing nature. Health enthusiasts or “biohackers” have become more common as a new, growing user-group. They are interested in monitoring their activities, and nature visits are motivated for example through mileage or step goals. There was little discussion about **biodiversity related applications** (BirdNet, iNaturalist, etc.). Overall, there is little information on the use of these applications in Finnish recreational areas.

After a nature visit, many people review their own trips by sharing their experiences on social media or in blogs, and this may increase the long-term nature experience.

5. Information needs for visitor tracking

Metsähallitus carries out extensive **systematic monitoring of recreational use**, but the monitoring system focuses primarily on national parks. The other participating organisations collected visitor data more **occassionally**. A large number of recreational areas (e.g. multi-use forests) are currently excluded from all types of visitor monitoring, which makes it difficult to plan their recreational services. **Visitor monitoring was found to be** so **expensive and time-consuming** that only larger organisations collect data extensively, and even their resources are limited. **The development of new ways of monitoring visitors was considered necessary**. E.g. Metsähallitus is currently renewing its visitor monitoring practices.

In terms of what should be monitored, two main themes came up. On the one hand, there is a need to understand **visitor flows** and, on the other, **different types/typologies of visitors.** Data collection was considered necessary for better monitoring, planning, and development of operations. The participants felt that the development of services requires a diverse understanding of who uses the services and where, when and how they use the natural areas. In developing more equal services, it would also be important to identify **groups that**, for one reason or another, **do not visit recreational areas**. In addition, the participants considered it important to better understand the **perceptions of visitors**, such as for example perceived safety.

The discussions also highlighted the **value of visitor data in demonstrating the importance of management actions** and the existence of recreational areas: information makes it easier to justify the need for resources and numerical data often makes it easier to communicate to needs to decision-making. On the other hand, justifying the need for one's own organisation with quantitative targets was considered difficult, as not everything can be measured in a meaningful way.

6. WHAT IS EXPECTED FROM MOBILE BIG DATA IN VISITOR TRACKING?

At the end of the workshop, the participants discussed their expectations: **could mobile big data support visitor monitoring and conservation management?** The participants also filled in the SWOT quadrant below, which we will use to unpack the discussion.

Strengths (S) • Continuous monitoring of visitors' locations helps in route planning and anticipating sudden changes. • Particular benefits for monitoring multi-use forests and sensitive natural areas. • The amount of information is extensive. • Big data could also be collected literately through crowdsourcing campaigns.	*Weaknesses (W)* • High resource requirements (see the following bullets). This applies to organisations of all sizes but is challenging especially to local nature associations. • Skill needs: it takes a lot to get understandable information from the data. • Knowledge needs: where would a small association start, for example, how to approach a mobile operator? • Location accuracy may not be sufficient.
Opportunities (O) • Big data could feed information into planning: for example, sports applications can tell where and how quickly different user groups are progressing on the tracks. Do I need to change routes? • Visitors could benefit from their data themselves, not just tech giants. • Visitor safety could be improved, for example accessibility in emergencies. • Crowdsourcing of endangered species.	*Threat(s)* • Data biases can lead to erroneous conclusions. • Big data platforms are constantly changing, for example, in 10 years there will be different social media platforms; changes can be sudden. • Should nature visitors have the right not to be tracked, i.e. the forest is a "digitally safe space", as one participant put it? • Is the freedom to roam, or “everyman´s right” threatened, if importance of nature needs to be quantifiable or measurable in euros?

All in all, various mobile big data were seen especially useful as a continuous data collection method that complements current knowledge production. On the other hand, it was obvious that for any data to be useful operationally it must be easily available. Therefore, the methods used by

researchers do not serve directly to operational purposes. The participants saw significant opportunities to develop the monitoring using own applications (e.g. Luontoon.fi).

7. Closing words

We warmly thank all the experts who participated in the workshop, as well as the Kone Foundation, which funds the project. We hope that through this and later workshops we will be able to produce useful information on the information needs and change prospects of visitor monitoring, as well as on the usefulness of data produced by mobile phones for these purposes. We will inform our participants and stakeholders about the progress of the work directly by email, and on our website https://www.helsinki.fi/en/researchgroups/digital-geography-lab/projects/mobicon.

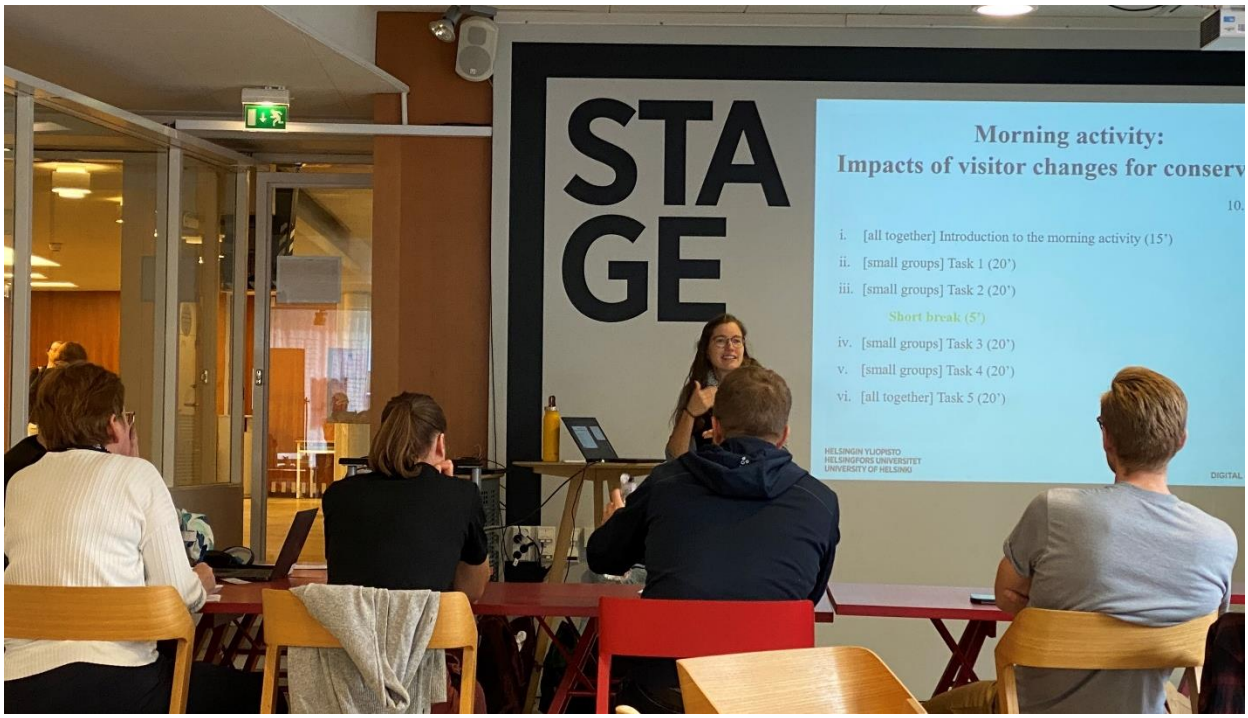

Figure 1. Brias Guinart explains the programme of the day to the participants.

8. LITERATURE

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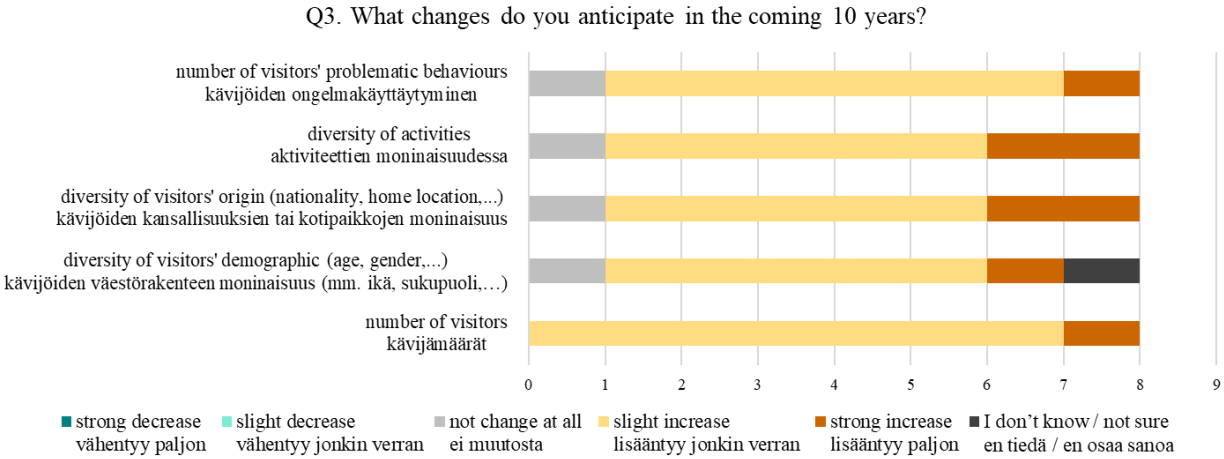
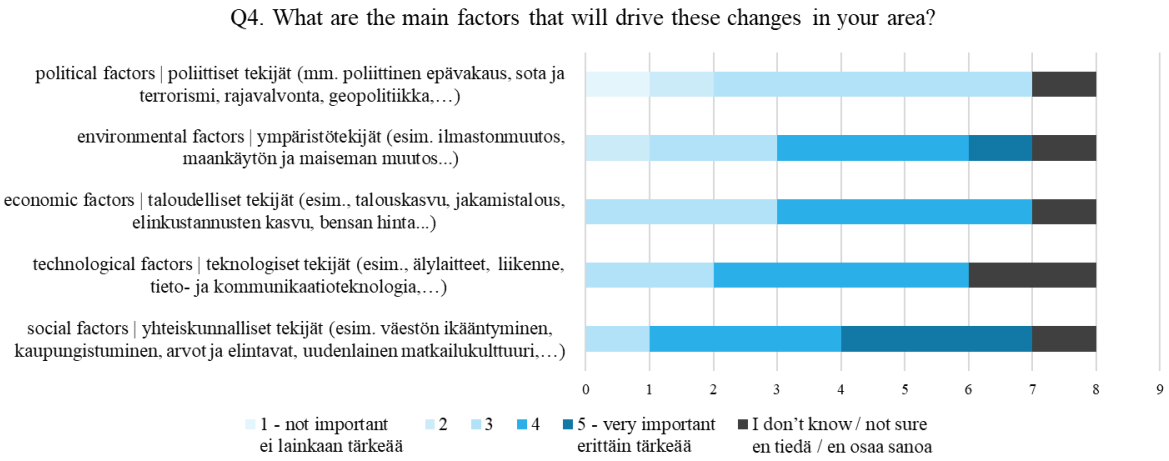
APPENDIX 1: SUMMARY OF THE RESULTS OF THE PRELIMINARY SURVEY

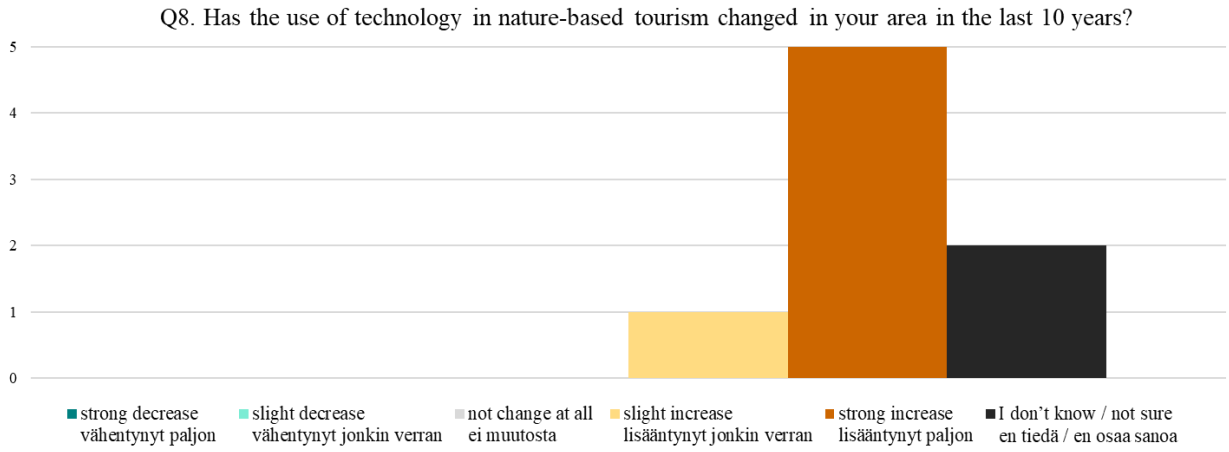
Before the workshop, workshop participants responded to an online survey. There were nine responses. Below are some excerpts from the responses we used to introduce the discussion.



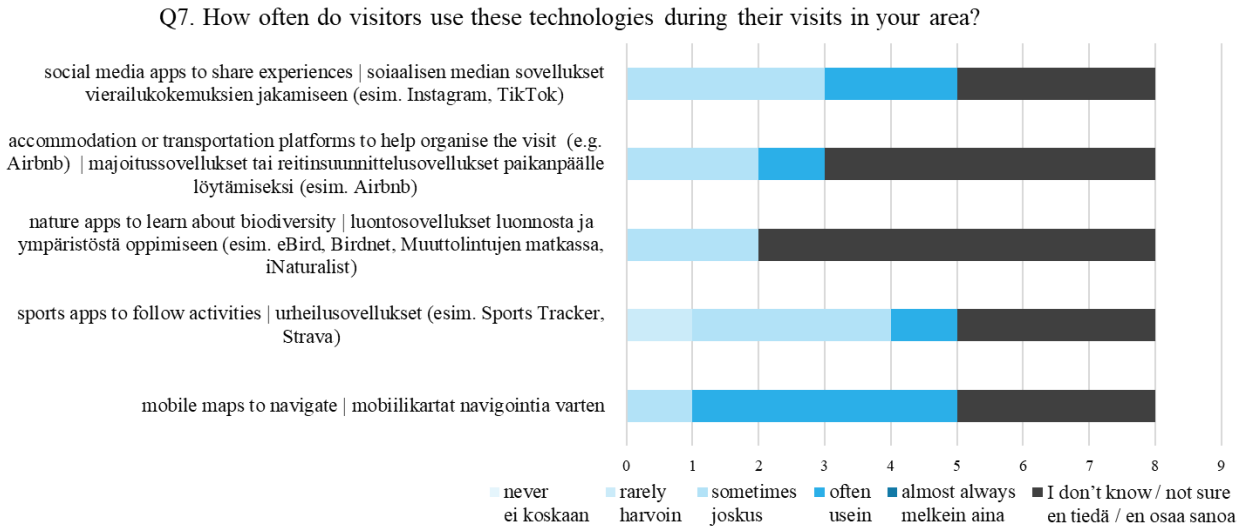
Q3. Participants' answers to a question on the factors behind the anticipated changes (Task 2, morning). In general, all forms of diversity are expected to increase. There is consensus on the increase in the number of visitors.

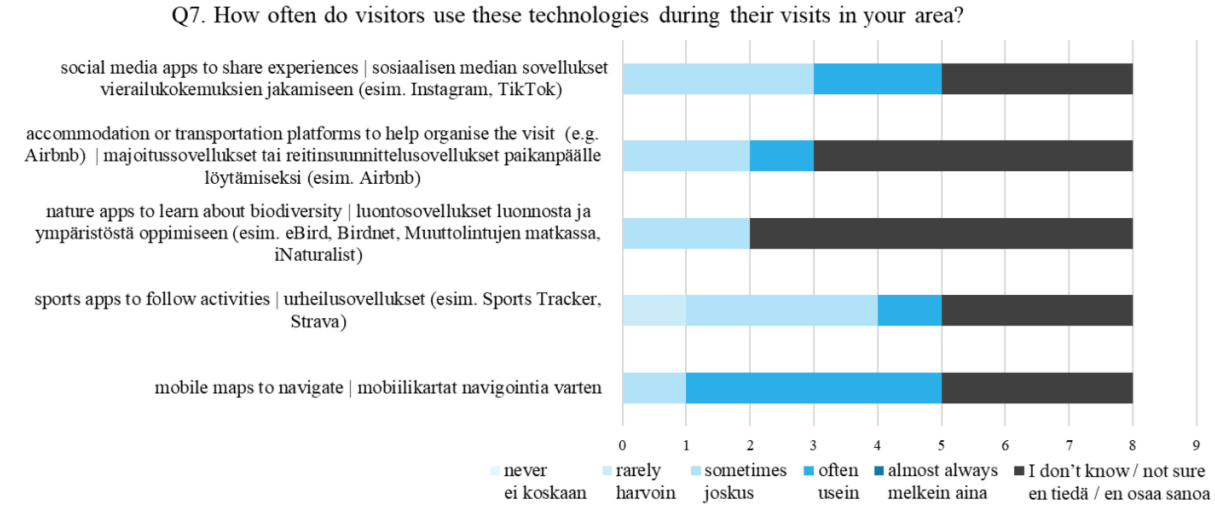


Q4. Participants' answers to a question about the use of technology by nature visitors (Activity 1, afternoon). Societal factors are estimated to have the greatest impact on the changes. On the other hand, societal factors are intertwined with all other changes.



Q8. The importance of technology as part of nature visits (before, during, after) is considered to have increased.





Q8. The use of various technologies (mobile phone applications) during nature visits is associated with uncertainty among specialists in recreational use.



Q5. Only some of the survey participants have systematic visitor monitoring, for example with the help of calculators. On the other hand, many acquire information by browsing social media, for example. The respondents have not utilised mobile data.