Nuuksio Collaboratory

A! Aalto University

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Design for Government course at Aalto University

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Executive Summary

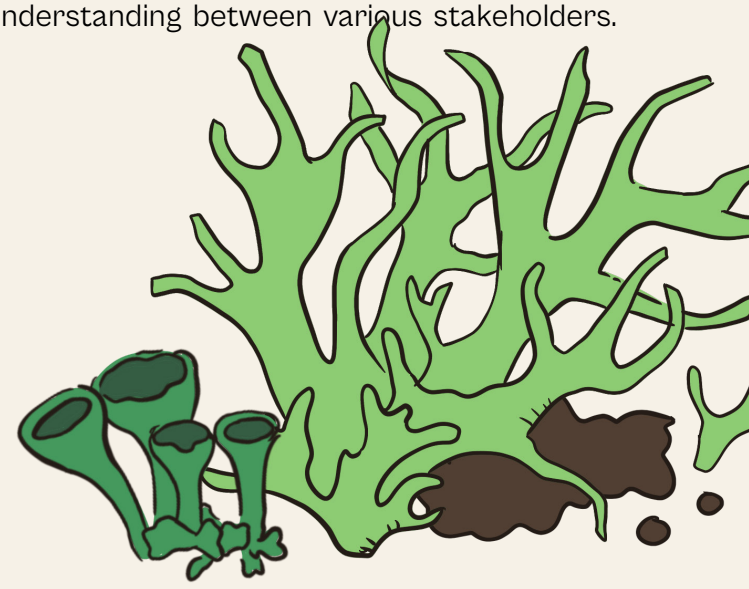
The Finnish nature recreational area has been an integral part of people's health and well-being, especially during the COVID-19 Pandemic. In 2021, there were over 4 million visitors in 41 Finnish national parks, which is a 25% increase from the year 2019 (Metsähallitus, 2022). As these national parks are also conservation areas, the rise in visitor interaction and footprint can damage the environment and biodiversity.

The project proposal acknowledges biodiversity as the primary stakeholder since the needs of biodiversity should be prioritized at all costs for the sake of our planet. Moreover, biodiversity is an important stakeholder, but it cannot speak and thus its needs are not fully understood. The scope of this project revolves around Nuuksio National Park and can be expanded to other National parks in Finland in the future.

The increase in the number of visitor groups in Nuuksio is resulting in both new problems towards biodiversity loss and escalating the intensity of the problems that always existed. This is problematic due to the disproportion in the increasing number of visitors in relation to the scale of Nuuksio. The majority of the visitors act unsustainably in the national parks because they are not aware of their own impact on biodiversity loss and most often this impact is not visible to them, making it difficult to comprehend the repercussions of their own actions. This is possibly a result of the current communication channels from Metsähallitus that is not comprehensive and the guidelines on how to behave are not reasoned in relation to biodiversity impact.

Currently, Metsähallitus is equipped with the ability to listen to biodiversity needs with the expertise of the scientists who work with them. But there is a gap in a common understanding between different stakeholders towards biodiversity needs. This is apparent since the scientists see visitors as harmful objects of prevention rather than understanding the circumstances that force the visitors to behave unsustainably. So, how is it possible to turn it around and see visitors as collaborators who are able to observe and solve their tendencies that lead to harmful actions towards biodiversity?

The proposal aims at increasing the level of agency of visitors to contribute towards reducing their negative footprint and increasing positive impact by bridging the knowledge gap on biodiversity in national parks through a citizen science approach. Nuuksio Collaboratory focuses on partnerships between scientists and visitors, through a one-year program that is initiated by Metsähallitus. Visitors engage in data gathering and co-creation workshops based on the ongoing scientific research by the scientists of Metsähallitus, in learning about sustainable behavior and contributing to new initiatives that can be implemented in Nuuksio. Above all, the proposal throughout acknowledges the goals of prioritizing biodiversity needs by enhancing a common understanding between various stakeholders.



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Human-Centered Research

Our process began by using different methods of research to gain a deeper understanding of the brief and to acknowledge the priorities of the different stakeholders that are involved in the project.

Our Stakeholders

The stakeholders included multiple profiles from the following organizations - Metsähallitus, Ministry of Environment, Ministry of Education, Haltia, WWF, Luke and SYKE. Apart from these governmental figures and former entities there are also the visitors of Nuuksio National Park and **lastly but most importantly our non-human silent stakeholder 'Biodiversity'**. Biodiversity, also known as biological diversity, stands for the variety of life found in a place on Earth at all its levels and even refers to the total variety of life on Earth (L. Pimm, 2022). Calling biodiversity a silent stakeholder, became a term for us as we noticed that biodiversity can't speak, is not easily measured and thus easily not understood or even misunderstood.

For us, it was important, to begin with, a broad stakeholder list for the brief in order to gauge a comprehensive understanding of the problem from multiple perspectives in an attempt to conduct research from an unbiased perspective. However, we quite quickly found our focus as we began exploring the impacts of visitors on the biodiversity in Finnish conservation areas and understanding the current role of Metsähallitus in protecting biodiversity loss in National Parks. We discovered that preserving biodiversity was the priority for our team.

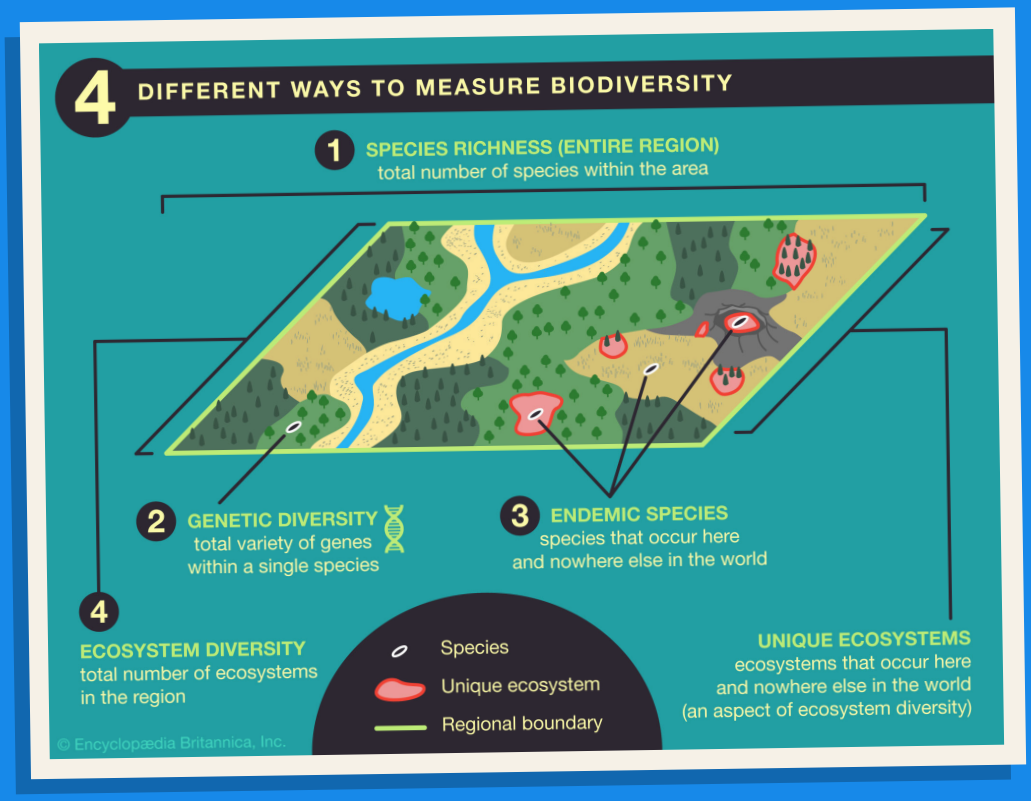


Figure 1. (L. Pimm, 2022)

Generating Questions & Answers

As we couldn't interview nature, we assigned each team member to do desktop research to understand the biodiversity threat further. For example, which species are most impacted by the increase of visitors, and what are the visitor's activities affecting the Finnish National Parks? Unfortunately, we've found assessing and finding concrete answers to these questions quite challenging as it's still hard to measure biodiversity loss and its relation to visitors' footprints.

The various research methods that we used in the process included individual interviews with stakeholders, surveys for visitor groups, and field research in Nuuksio National Park that helped us gather data to find some of the answers that we were looking for.

A roundtable discussion with the different stakeholders was conducted along with the supergroup (other teams working with the same brief). Some key questions included understanding the roles and collaborations between stakeholders towards preserving biodiversity, the different impacts, and attitudes of varying visitor profiles in national parks, and ongoing actions and initiatives in restoring biodiversity loss.

We continued to gather deeper insights with Susanne Nylund (Lead Service Designer in Metsähallitus), Teemu Laine (Nuuksio Foreman), and Kaisa Junninen (Specialist in Nature Conservation). These interviews were core to our project since these stakeholders, who are experts in their field, were acting as mediators in collecting information on the visitor impact in Nuuksio and needs for biodiversity preservation.

The insights from the desktop research and interviews made it more apparent for us to get a visitor perspective. This onset of our journey to Nuuksio National Park to observe our own actions as visitors, generated firsthand information from visitors about their needs, and also interact with front-line staff who are witnesses of the biodiversity.

loss and possibly have some explanations for it. One of the learning was that the communication to the visitors by Metsähallitus, regarding biodiversity needs is not addressed in a comprehensive manner and this possibly results in visitors being unsure of how to behave sustainably since they do not realize the impact of their actions. This was also validated later during the process by many of our other interviewees. To mention a few:

> "You (visitor) have to find a lot of information on your own.
>
> - Haltia Employee

> "Often, people also want to climb to exquisite places to take pictures, and then one does not realize, that they are trampling lichens or other vegetation. If there are no designated sightseeing spots, people will surely make routes of their own to get to the beautiful scenery.
>
> -Nature Conservation Planner

Note. **Translation from original quote:** "Usein ihmiset myös haluavat kiivetä hienoille paikoille ottamaan kuvia, ja ei sitten tajuta, että samalla tallovat jäkäliä tai muuta kasvustoa kasvillisuutta. Jos ei ole tehty näköalapaikkoja ihmiset tekevät kyllä varmasti omia reittejä, jotta pääsee näkemään kauniita maisemia."

Figure 2 and Figure 3. Fieldwork Observation, Nuuksio National Park (own photo).

The methods in the research phase contributed to generating answers but also opened up a plethora of questions for us to investigate further.
Some of the questions included the following:

1. Why do visitors behave unsustainably in spite of the guidelines of National Parks?

2. What is the major visitor impact that causes the most biodiversity harm?

3. How can visitors realize the impact of their actions on biodiversity?

Systemic Analysis

Systems thinking helped us to understand this complex topic further and eventually even led us to our problem area. Activities during the time included more stakeholder interviews, systems mapping, and affinity mapping for generating insights – all aiming to understand the relation of the stakeholders and their activities affecting biodiversity.

Mapping the Visitor Journey

To make sense of the data that we had gathered, we embarked on a journey of 'Systemic analysis'. We used a rich picture systems map to detail a visitor's journey in National Parks, from planning the trip at home, going to the recreational sites, what the visitors might be experiencing in the park, all the way to the thoughts after the visit. Alongside, it felt natural to also start mapping out the infrastructure of Finnish National Parks, which turned out to be quite an extensive mission. These allowed us to unravel the interdependencies between different stakeholders' roles and an enhanced understanding of the cause and effect of certain behavior in National Parks toward biodiversity needs.

Here are some of the insights that we achieved through the systems mapping:

- Need for informative signage about rules and information in strategic places
- Digital touchpoints for Metsähallitus to communicate with the visitors (Before coming to the recreational area, On arrival (navigation, documentation), After the visit (memories from photos taken in the area, social media posts)
- Potential for natural recreational areas as two-way communication meeting points between Metsähallitus and citizens.

Affinity mapping was another tool that also helped in a deeper analysis of the data. The process included gathering all the findings and identifying and clustering themes to generate insights. The results from the process helped us to move and narrow toward the existing communication flows and the gaps that exist.

Key Insights

The following are some key insights that were derived from the research phase. It provides deeper reasoning as to why visitors tend to behave unsustainably in national parks and also addresses the lack of feedback channels, the presence of which could potentially lead to enhanced biodiversity preservation.

Insight 1:

Most harm done by the visitors is unintentional because the impact is not visible to the visitors, it is long-term, and visitors don't acknowledge the multiplied effect that it has on the biodiversity.

This insight led us to understand that rules and guidelines play an important part in making visitorsaware of their impact. This was particularly important since a comprehensive understanding of these rules would pave the path for sustainable visitor behavior in Nuuksio and visitors being able to realize the intensity of their own impact in national parks.

Based on our visit to Nuuksio, we made a guideline performance analysis of the current communications of Metsähallitus and we looked at aspects such as:

Quantity - the likelihood of missing the touchpoint where the guidelines are outlined

Quality – the likelihood of not understanding the guideline or not being able to integrate as it

During our field visit to Nuuksio, we realized that physical signs play an important part in the communication of guidelines since not all visitors see the guidelines on the internet before entering the park. On the route we took, we came across two signs that outlined rules and guidelines, but the guidelines were limited compared to the outdoor etiquettes. Moreover, guidelines do not communicate the impact on biodiversity due to the unsustainable actions of visitors.

Figure 5. Outdoor Etiquette Poster being advertised but not outlined, Nuuksio National Park (own photo).

Another important learning was that external factors force visitors to behave in a certain manner. For example, frozen snow on the route directly resulted in us stepping away from the route. Our own engagement in these harmful actions was a result of following our intuition in situations where there was no other clear option.

Insight 2:

The lack of user feedback, strategic processing in the organization, and encouragement for collective actions leads to the missed opportunity of increasing visitor agency over preservation

From our visits to Nuuksio, we spoke to some visitors who were aware of visitor actions that harmed biodiversity and also some problems in Nuuksio that they noticed. But in spite of that, they did not take any actions towards reporting these issues or individual actions to mitigate the harm by others. Some examples include trash lying on the ground, the woodstock being empty to light campfires, or unreadable signage. Our evidence from our field visit made it apparent that there was no presence of any physical feedback channels or information posters for visitors to share feedback.

Complementing this data there was also desktop research where we noticed the lack of clear or easy steps which would lead visitors to engage e.g. provide feedback on digital platforms. From our interview, we found that not all visitors even know that Metsähallitus is responsible for managing the National parks in Finland and hence visitors do not navigate to the Metsähallitus page to provide feedback. Currently, one can provide feedback at the Metsähallitus website but there is no presence of it on the website for Nuuksio.

A quick search on the web for “Nuuksio Feedback”, would lead to the TripAdvisor page or google review, which currently has thousands of reviews from visitors. We learned that there is a lack of strategic touchpoints to integrate the valuable inputs from visitors and the feedback that is currently received by Metsähallitus is not utilized. During the roundtable interview, one of the stakeholders from Metsähallitus also mentioned that “We receive a lot of feedback, but this feedback is not handled in a strategic way”.

Therefore, we saw an opportunity for emerging visitor agency towards biodiversity that is missed because of the lack of encouragement for collective actions, and the project started to shape itself towards exploring the communication gaps that exist between our stakeholders towards improving biodiversity needs.

Design Intervention

After progressing with the project through our research analysis and generated insights, the focus shifted to identifying, defining, and justifying the problem area leading to the solution space. However, the priority during the project remained the same, prioritizing the non-human stakeholder, biodiversity.

Identifying Communication Gaps

Based on the insights, the aim was to identify the gaps that currently exist in the communication flow between our stakeholders in understanding biodiversity needs. One of the key learning that helped frame the starting point was that currently biodiversity is bearing the impact of visitor footprint but the dialogue from biodiversity is missing. Only Metsähallitus is equipped with the resources and tools to listen to the needs of biodiversity directly by utilizing the knowledge from experts.

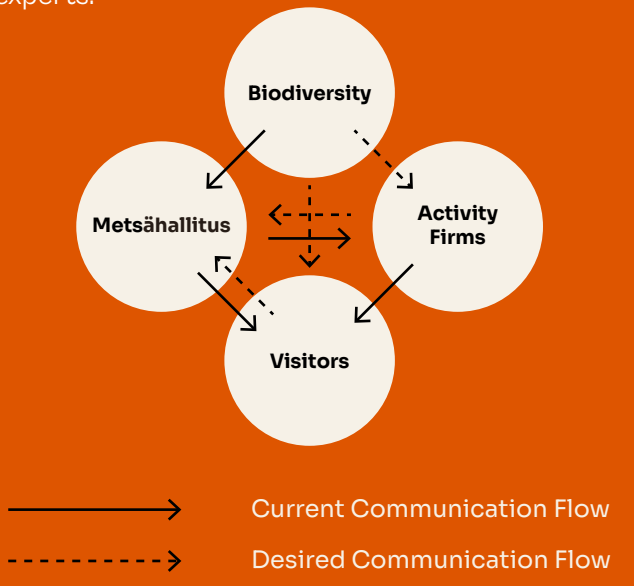


Figure 6. Communication Flow ↑

Mapping the Leverage Points

The Leverage Points by Donella Meadows (Meadows, 1999) was a useful tool in discussing and identifying the places to intervene in the system. We mapped our core problem areas into the different leverage points to realize that the solution space could lean towards interventions at the strategic levels by influencing the goals of the system and also at lower leverage points by altering the feedback loops that currently exist.

Through this process, we were questioning if a higher leverage point always results in a greater impact in the system, and this helped us understand the importance of limitations and boundaries that must be considered before making these choices. For example, we would have to consider criteria such as the resources and the ability that Metsähallitus can leverage to catalyze the change.

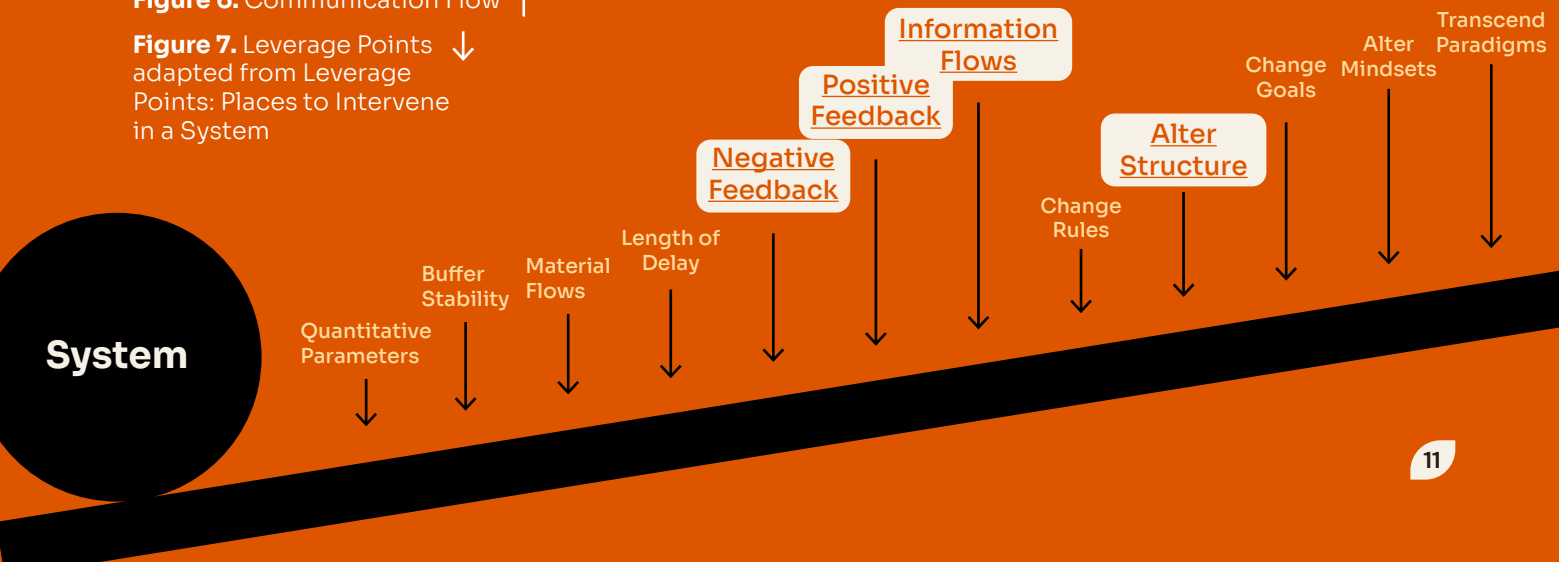


Figure 7. Leverage Points ↓ adapted from Leverage Points: Places to Intervene in a System

Turning Negative Impacts into Positive

One of the findings that re-surfaced through an interview with a specialist in Nature Conservation was the concern of increasing negative impact on biodiversity because of new users and visitor behaviour in the national parks in relation to the size of Nuuksio.

However, our understanding was enhanced through the questionnaire and our observations. We learnt that visitors come to national parks for nature connectedness, and no one wants to purposefully behave unsustainably. It may just be a matter of circumstance, misunderstanding, and lack of communication.

We used a storytelling scenario to define the problem or situation we wanted to change and imagined what an ideal scenario would look like to help us start framing the design intervention. Our story is communicated through a regular visitor of Nuuksio, who notices certain things that could be harmful to biodiversity. For example, loud music that could disturb the animals living there or trash left by other visitors. She wants to act upon it and share some ideas with Metsähallitus but is unsure how. She can locate the feedback page with some difficulty on Metsähallitus's website but sees no point in it this time since her suggestions had not been addressed previously.

This process helped us understand that there are informed groups of visitors who understand the value of the national parks and would like to share their inputs with Metsähallitus. In other words, visitors could have a positive impact if given the resources and platform to voice their thoughts. The results of our questionnaire also confirm this hypothesis; most of our respondents would like to know more about biodiversity and visitors' impact on them and take part in biodiversity preservation. Moreover, 97% of the respondent said yes to the question, "If you found that your actions were harming biodiversity, would you be encouraged to reduce your negative impact on biodiversity by observing your behaviour while visiting?".

As we started to define the pros and cons of each problem area, we could see their interconnectedness. For example, visitors would be able to realize their agency's potential only if visitors were educated about biodiversity needs. Understanding this helped us re-iterate the importance of finding ways to translate the negative impacts of visitors on biodiversity into positive through bridging the knowledge gaps and increasing visitor agency.

Citizen's agency or participation's positive impacts on preserving biodiversity in national parks were backed by examples of best practices in different parts of the world on interventions where citizen participation has been vital in sharing diverse perspectives on biodiversity preservation. Such as the case study of public participation and governance in Triglav National Park and Cairngorms National Park Authority (CNPA) Board in Cairngorms National Park, where the key learning was the importance of suggestions based on ground-level experiences of the visitors in relation to biodiversity impact rather than top-down initiatives from stakeholders that do not necessarily interact with biodiversity regularly.

Increasing the Agency:

From Harmful Objects of Prevention to Partnership

As we have described through the leverage points, we wanted to design a strategic level design object that would enable visitors to learn about their impact and ultimately, manage it.

In solving problems, the risk of overuse of common-pool resources needs to be considered.

In “Design principles illustrated by long-enduring common-pool resource institutions” Elinor Ostrom states that “Most individuals affected by operational rules can participate in modifying operational rules.” (Ostrom 2015, 177; Ostrom, 1990). Ostrom also highlights the practical knowledge of the ground-level agents rather than

top-down regulations that are created afar from the site. As the level of inclusion of visitors in the biodiversity matter was significantly low, we wanted to increase their participation in making the policies of the park. The assumption, that this would lead to an increased level of preserved biodiversity was based on Ostrom's theory. (We acknowledge that the theory provides a meticulous set of principles on how to implement the framework successfully, and this would require more comprehensive work. Our design proposal was settled by taking inspiration from the framework.

We've concluded that visitor's perspective are valuable in protecting biodiversity, as they're the ones interacting with biodiversity on a regular basis. However, visitors were not seen in this way. Quite the opposite, it seemed to us that visitors are unnecessarily often seen as harmful objects of prevention, a specialist in nature conservation mentioned that they think the best thing visitors could do is to not visit. Even though we've identified that the harmful actions are not done out of not caring, but simply not knowing.

To help us frame our intervention to increase the visitor's agency, we used the "Ladder of participation", a participatory model arranged in a ladder pattern where each rung corresponds to the extent of citizens' power in determining the plan or program (Arnstein, 1969). Through this typology, Arnstein visualizes the significant progression of citizen participation; the lowest two rungs describe levels of "non-participation", where the objective is to enable power-holders to "educate" or "cure" participants. Rungs three until five progress to levels of "tokenism", which allow the people to hear and have a voice. The three top rungs are levels of citizen power with increased degrees of decision-making.

Our observations show that the current level of inclusion of the visitor's contribution to preserving biodiversity in Nuuksio is relatively low on many levels. To manage their behavior towards biodiversity, visitors should climb quite a few steps on the "Ladder of participation". We believe that "being informed" could be the start: visitors should be communicated the impacts of their actions on biodiversity to understand the reasons behind guidelines. However, as mentioned in the typology, very often, the emphasis is placed on a one-way flow of information (from officials to citizens) which we want to avoid by allowing visitors to respond, give inputs, and convey "information" back from the visitor's perspective to Metsähallitus for feedback.

Therefore, our design intervention aims to push the participation and agency of Nuuksio national park's visitors to at least the level of "Informing" and even up to the level of "Partnership" in solving biodiversity issues. Our aim through our intervention is for these stakeholders to recognize that they share a common goal. We wanted to design something where visitors would be seen as partners in preserving the biodiversity of Nuuksio and build on their expertise of being a visitor.

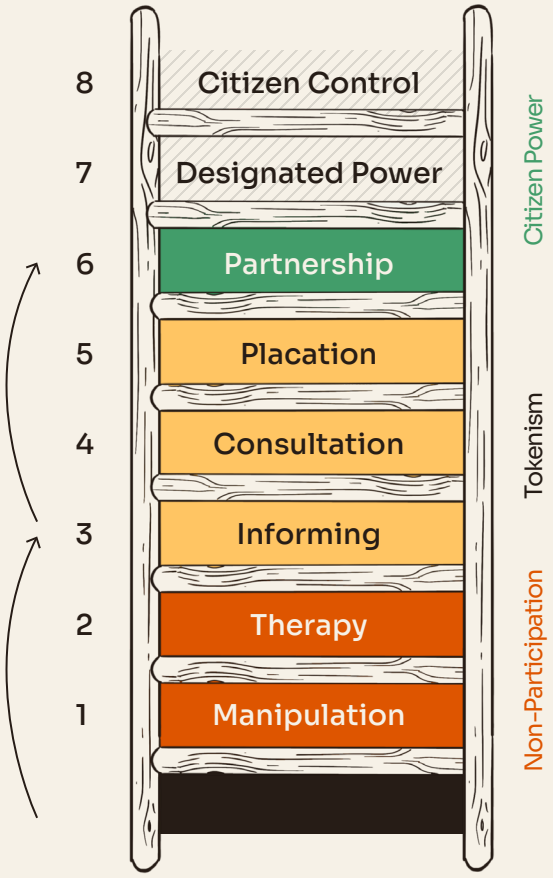


Figure 8. Adapted from: A Ladder of Citizen Participation. Arnstein, S.R. (1969)

Final Proposal:

Ingredients & Benchmarking

Our key insight (the lack of visitor partnership) was a result of the human-centered research. However, our ultimate goal was to shift from human to biodiversity-centeredness. We needed to solve the question: how can visitors help the local biodiversity when they don't have the means to listen to its needs? The visitors should be able to interpret biodiversity but lack the scientific expertise to do so.

What kind of design object would direct the increased level of agency of the visitors into relevant actions towards preserving biodiversity?

We discovered **Citizens Science** practice, which means "volunteer collection of biodiversity & environmental information which contributes to expanding our knowledge of the natural environment, including biological monitoring and the collection or interpretation of environmental observations." (Tweddle et al., 2012). In practice, this could mean for example citizens taking part in data gathering and monitoring by collecting samples or documenting species as a part of scientific research. Metsähallitus has already been organizing these events under the title "Bioplizt" in collaboration with other organizations (Luonnokirjo, 2021).

In this phase, we detected that the most relevant gap between the stakeholders for us was between the scientists and visitors. In an interview, a specialist in nature conservation even mentioned that they think that the best thing visitors could do is not to visit. We wanted to design a platform where these stakeholders could acknowledge that they have the same goal of preserving the local biodiversity and start to build policies together towards it.

Our first idea was to combine a citizens' science project with co-creating better policies for the park. As a platform for encounters, Citizen Science alone would bridge the knowledge gap between the scientist and visitors, but we wanted to design a structured program where also solutions for these problems could emerge.

Our aim was to harvest visitors' creativity in solving the problems related to their visits. We wanted to enable visitors to contribute to designing the policies of the park. One of the crucial benchmarks for this idea was provided by Metsähallitus themselves with their "Year of the Fish 2021" campaign: "Finnish fishers and outdoor enthusiasts sent Metsähallitus dozens of tips on how everyone can promote the cleanliness of fishing waters and the welfare of fish." (Metsähallitus 2021, 77). Some of these ideas were published in Metsähallitus communication channels and taken into account when publishing Outdoor Etiquette for fishing and hunting in 2022. We were curious: how much more potential there would be if there was a proper platform to foster this co-creation? The idea grew only stronger when we visited the park ourselves. We were filled with ideas when visiting the park as something that we had the agency to improve.

Regenerative tourism has been offered to solve the destructive impacts of mass tourism on the local environment and society. We also found the concept of Creative Tourism (Richards 1999), which refers to a visitor taking part in creative activities. Our project was positioned somewhere between these: creative visitor generating actions towards regeneration or preservation.

In this section, we will describe our final proposal,

Nuuksio Collaboratory

Nuuksio Collaboratory is a one-year program where visitors of Nuuksio National Park participate in a citizen science project led by Metsähallitus scientists to co-create solutions for the local biodiveristy loss.

The outline of the program has four phases:
(1) First, the scientist defines a biodiversity issue, for which **(2)** the visitors collect data during an educational walk in the Nuuksio National Park. In the third phase, Co-creation **(3)**, visitors generate solutions for the biodiversity problem based on the research they conveyed. In the end of the year, some of the solutions will be selected for **(4)** implementation by Metsähallitus.

The program is a pilot, and we hope that it will be implemented in other national parks too, later on.

For the program to succeed, Metsähallitus should hire a dedicated worker to take care of the program a Nuuksio Collaboratory project manager, and allocate working time for the scientist and the service designer. In addition, Metsähallitus should allocate a budget for the implementation of each year's solution generated in the program.

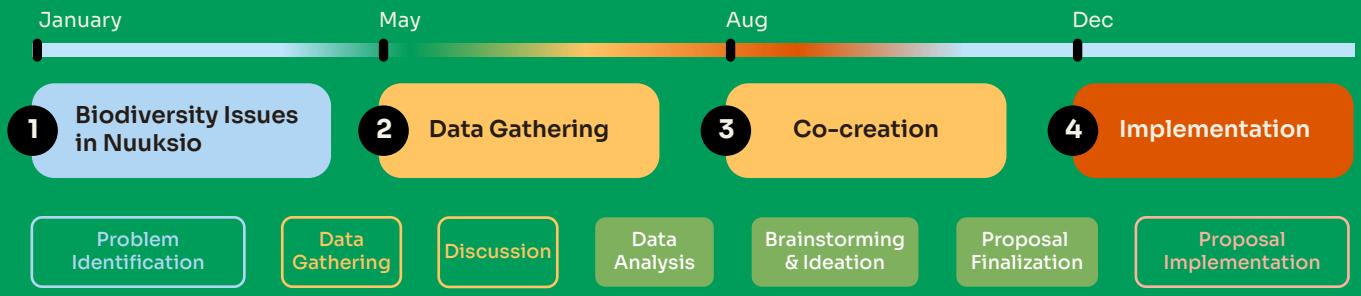


Figure 9. Four Phases of Nuuksio Collaboratory

Next, we will go through in detail the program structure through the lens of visitors, Mona and Joel.

Joel

Frequent Visitor
& Nature Lover

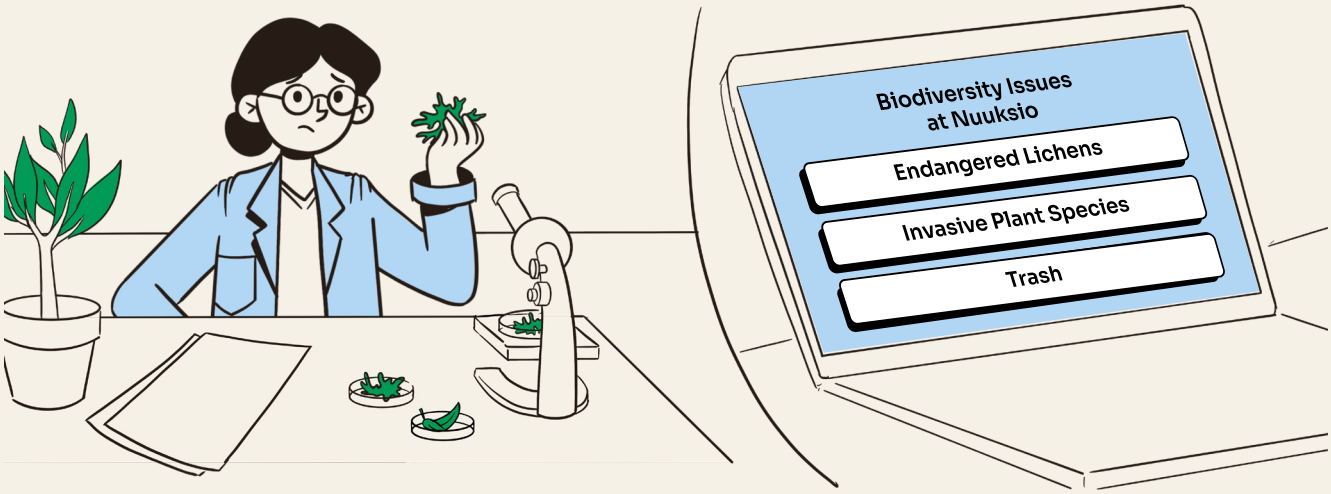
Mona

New Visitor,
Adventurous

Figure 10. Mona and Joel

1 Scientists Identify Biodiversity Issues in Nuuksio

At the beginning of the year, scientists identify three biodiversity issues in Nuuksio. The three issues will be published on the program's site. Then, visitors then can choose an issue that they care about and want to investigate.



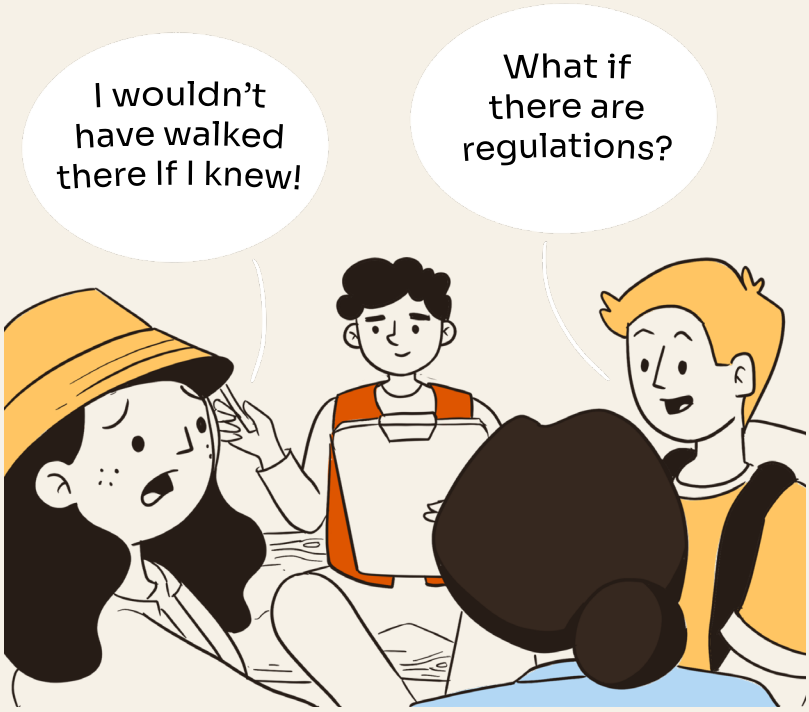
Advertising of Nuuksio Collaboratory

Mona stumbled upon a campaign promoting the collaboratory program on her social media. Our second visitor Joel, during his latest trip saw a poster on the entrance for this program. He scanned the QR code with his phone, signed himself up for the program. Now they've both booked the guided data gathering session.

2 Data Gathering & Participants Discussions

On the second phase, data gathering, visitors participate in an educational walk in Nuuksio lead by the scientist. They explain the issue for the visitors and instruct the data collection.

Mona and Joel walked around Nuuksio National park, observed, and documented lichens. During the walk, Scientists explained further how Nuuksio is home to many endangered lichens species and told the visitors more details about them. Mona & Joel also learned about the impacts of visitors on biodiversity there.



At the end of the walk, there will be a facilitated light ideation session where visitors are be able to voice their initial thoughts and ideas right after the experiencing the circumstances.

Mona and Joel submitted their data to the Collaboratory website and they gathered around the scientist and the project manager. There, they discussed their findings and observations and ideated ways to protect the lichens.

Mona only joined the data gathering phase, Joel, on the other hand will be continuing to the co-creation and implementation phase.

3 Co-Creation

In the co-creation phase, there will be three workshops for the visitors held by the service designer and the collaboratory manager.

#1 Data Analysis

Together with the scientist the visitors will analyze and interpret the collected data.

Guided by the scientists and the service designer; Joel and the other visitor analyzed the data that they've gathered. After seeing the photos collected, it seems that some lichens are trampled by humans or animals in the park. After mapping out the location of these photos, they started to see the patterns on where the lichens are most impacted.

#2 Brainstorming & Ideation

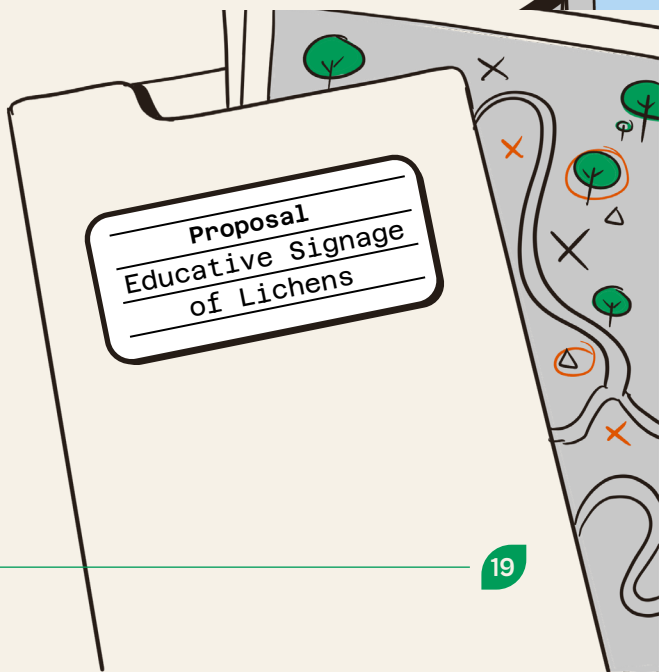
In the second workshop, the participants collaborate to ideate a solution based on the insights on the data.

The service designer facilitates brainstorming and ideation sessions between visitors, scientists, and the collaboratory manager. Ideas generated from the data gathering phase were also brought to the table. Ideas were proposed such as educational signage to tell visitors to be more cautious around the lichens or publishing an educational video about lichens.

#3 Proposal Finalization

In the last workshop, participants finalize proposals that will be sent out to Metsähallitus.

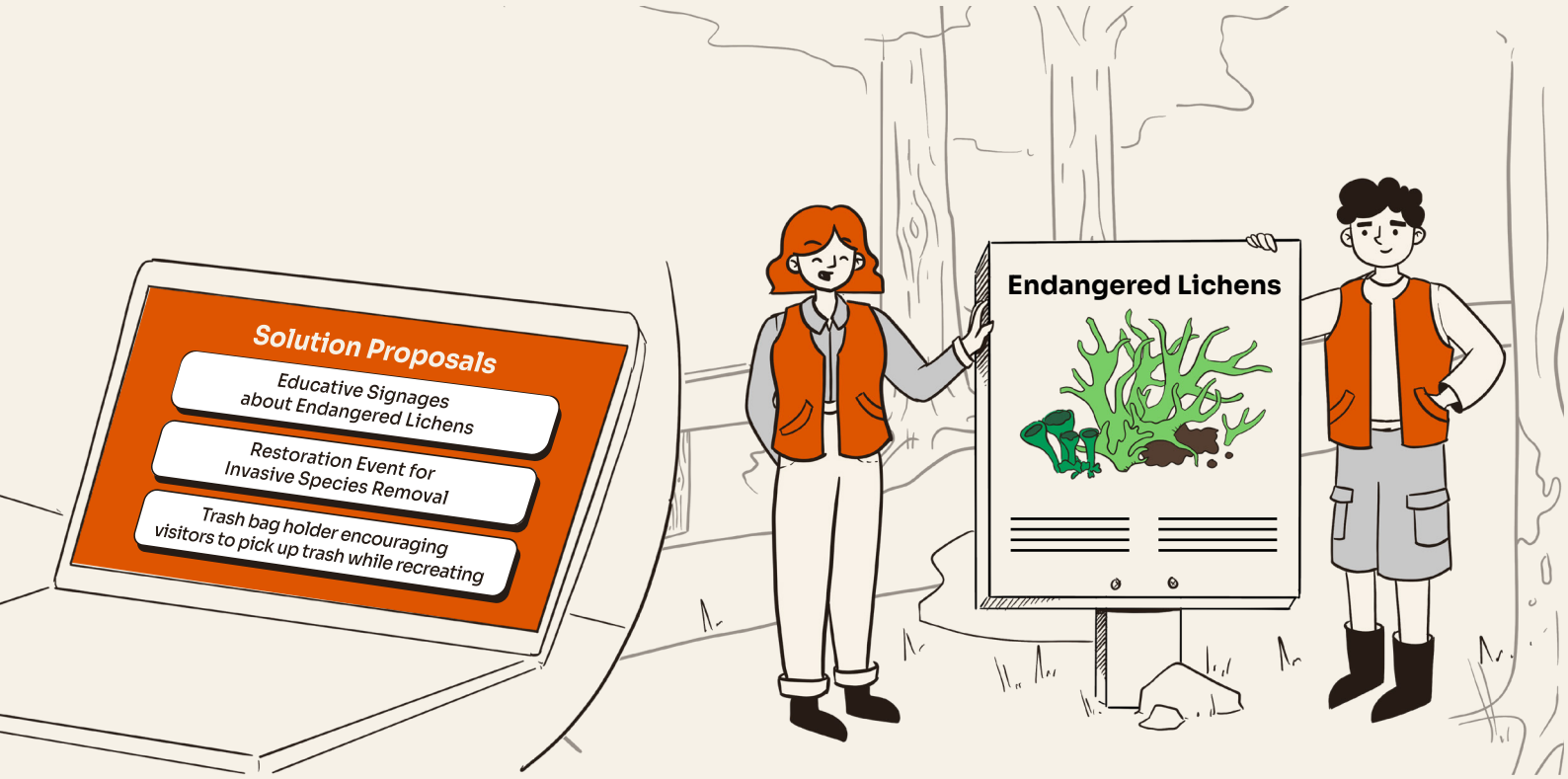
On this phase, Joel finalizes the proposal with scientists, the service designer and the collaboratory manager. Here, they refine the proposal by choosing the locations for the signages and estimating the budget needed to implement this proposal.



4 Data Gathering & Participants Discussions

There is a budget allocated for implementing at least one of the solutions ideated in the program. At the end of each year, Metsähallitus will decide the most impactful proposal for implementation. Depending on the proposal, implementation will be procured accordingly.

At the end of the year, Joel and his team's proposal on educative signage about the endangered lichens was then chosen by Metsähallitus for implementation.



Value for the Stakeholders

Visitors

Studies (BiodivERsA Report, 2020) suggest that joining biodiversity-focused projects is linked to gaining new-found knowledge about biodiversity, increased nature connectedness, and increased desire to contribute to nature conservation actions.

Some visitors hope for more activities and events in Nuuksio, then citizen science walks can serve also a day activity for families.

Scientists

The visitor helps in data collecting and monitoring increases and improves research data in terms of amount and spatial coverage.

Helps bridge the gap between scientists and visitors towards a mutual understanding of biodiversity needs. The collaboration also breaks the barrier between researchers and society which increases public acceptance of research results.

Metsähallitus

Visitors are more aware of their biodiversity impact while visiting the park. By the end of the program, Metsähallitus receives robust proposals for solving negative visitor impact on biodiversity. They might also see value in the network of active citizens who are willing to contribute in conservation and regenerative actions.

Conclusion

The project was challenging in grasping a good understanding of the problem in such a short span of time, especially as the problem is different from the perspective of different stakeholders involved in the project. However, after lots of research, many profound discussions, and a pool of potential ideas we indeed managed to create a solution that all of us could stand behind.

> "How can we reduce the negative footprint and increase the positive impact of visitors by bridging the knowledge gap on biodiversity in national parks?

Our answer to our research question above ended up being collaboration and more specifically citizen science. Not only citizen science had been proven successful elsewhere, but we also felt creating a platform for scientist and visitor collaboration for preserving the local biodiversity was exactly what Nuuksio National Park needed in addition to their other efforts.

The beauty of the solution really is that it's a great fit for Nuuksio; it supports multiple different actors and most importantly increases the well-being of our silent stakeholder Biodiversity through increased data points combined with overall better understanding. Also, the skill required to build our solution is actually already found within Metsähallitus. Thus, we eventually felt that this solution really did have the potential to fulfill our goal: increasing visitor agency.

Key Project Learnings

VISITOR AGENCY. In a way, we had circled around collaboration and unused potential of the visitors in preserving biodiversity throughout the process. Already during our very first field trip, we had noticed where our capabilities lay as visitors and where we would have needed more support with. Going to the national park, the energy combined with willingness that we had would have been easily channeled to actions but there was no easy way to do it. We also noticed other factors, later identified as our problem areas, that were in the way of visitor agency.

MAINTAIN THE FOCUS ON BIODIVERSITY. From our first stakeholder interaction, it was slowly becoming evident that the priorities of different governmental bodies that work for the development of Nuuksio might be different. Also, various members of our supergroup, who have engaged with biodiversity issues in Nuuksio, previously saw a different angle to the problem that should be tackled first. Through the research phase of the project, it was important to first identify the root causes of biodiversity loss instead of entirely relying on the problems that were communicated through the brief. The interactions with stakeholders in the process were key in enhancing our understanding and establishing biodiversity as our primary stakeholder for the project.

MULTIDISCIPLINARY. We also came to realize that biodiversity loss was definitely a wicked problem and hence we had moments when all this seemed impossible to solve. Moving ahead with the project as successfully as we did was only possible because of the multidisciplinary approach that was applied toward de-coding and solving these complex issues. With multidisciplinary, we mean team members that have come from different backgrounds and experiences. And also using a design approach in a sector that relies on the experiences of policymakers to solve the complexities that currently exist. In this case, design thinking tools were valuable in opening up a new chain of thought, questioning the current biases and possibilities that are communicated. As viewing this through a collaborative multidisciplinary approach was essential even for us as a group it also meant that scientific knowledge alone is definitely not sufficient to address this problem. One single solution does not exist because biodiversity and forest have so many levels of their own in addition to cultural and social angles.

Limitations and Future Scope

Although the team stands with the process and the results, we acknowledge that with more data points, our statements would have gained more reliability. Unfortunately getting in touch with the scientist stakeholder segment ended up being a surprisingly difficult task. The take was marginal both with interviewees and survey respondents. We would have hoped for more interviews and more variety on survey demographics. However, we do consider our research qualitative, as every piece of knowledge was collected with intent.

Due to the limited time we had in producing this proposal and the complexity of biodiversity monitoring, we also unfortunately could not propose a method to evaluate the success of this program. Therefore, for implementation, we recommend piloting this program with a smaller group of visitors so it is easier to monitor its impact for evaluation. We expect feasible KPIs to be clarified after the first testing rounds. However, one important indicator would for sure be the increase of visitor engagement and increase of research findings from collaborative biodiversity monitoring by the end of the testing period. One possible threat for the success identified by the group is demotivation caused by the small amount of proposals implemented (in the model: only 1).

On another note, something that excites us and hopefully readers too is that the future of our solution looks quite exciting for three different reasons:

1) Scalability
Even though our solution is in a way tailored to serve especially the needs of Nuuksio, the model itself could be implemented in other national parks of Finland as well. The benefits of that would include savings in resources as the work of the service designers, such as the creation of the platform and the co-creation methods and tools could be used 'as is' no matter the place or time.

2) Biodiversity finally becoming important part of the strategies
Biodiversity, more specifically biodiversity loss, is a hot topic right now. For example, in the EU's strategy biodiversity plays a major role for the upcoming years (Biodiversity Strategy for 2030, 2022). This not only means that these kinds of biodiversity related activities and projects will gain more attention, but that the budget and opportunities to get funding is expected to keep growing massively.

3) Metsähallitus seeing eye to eye
During the day of the presentations we heard that Metsähallitus was more than willing to take the solution onboard and could even incorporate it into one of their ongoing efforts. The work culture was also accepting as they themselves stated biodiversity as their 'boss'.

Reflection

As designers, we learnt about the importance of the maintaining a research approach long enough in the beginning of the project. Firmly retaining oneself from solustionistic approach during the first weeks of the project led us to unpredicted problem framings later on.

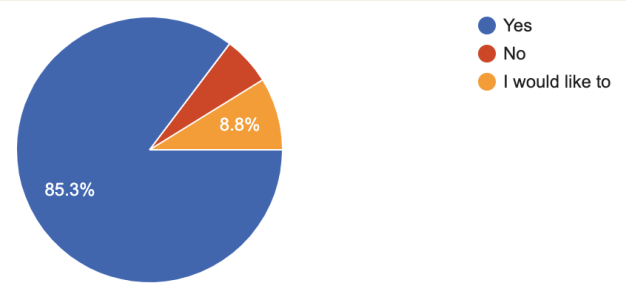
We learnt that working with wicked systemic problems require accepting a certain level of not-knowing. We struggled first with not being able to grasp a comprehensive picture of the visitor damage. For designing an intervention, which would tackle a specific damage, we would have wanted find out more detailed data about each type of damage. After a while we had to accept that it is ok to not know everything.

While all of the team members have their own individual experiences to reflect on, what we collectively learned through the process was that 'done is better than perfect'. Seeking for perfection is something we as a group tend to do quite a bit especially because the topic of the project was really connected to our values. It is so easy to forget that innovation actually often starts with imperfect ideas (Krasser, 2017). And it's even easier to feel like there are never enough resources (Derrick, 2022). During a project this definitely manifested into our thoughts as 'I wish we had more time' or 'I wish our team would have stayed healthy during the whole course". However, the closer we got to our performing stage as a team the more we turned it around, and focused on how we might use our limited time together the best we can. In the end, everyone was very proud of the things we achieved. (W, & W,2022)

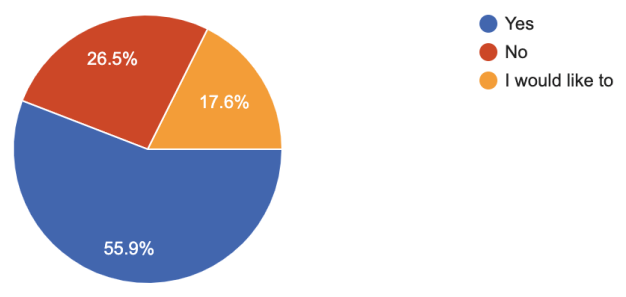
Appendix

Research survey conducted with 35 respondents who have visited Nuuksio National Park.

Have you visited Nuuksio National Park?



Have you visited any other National Park in Finland?



Please answer the following questions only if you have visited any National Parks in Finland.

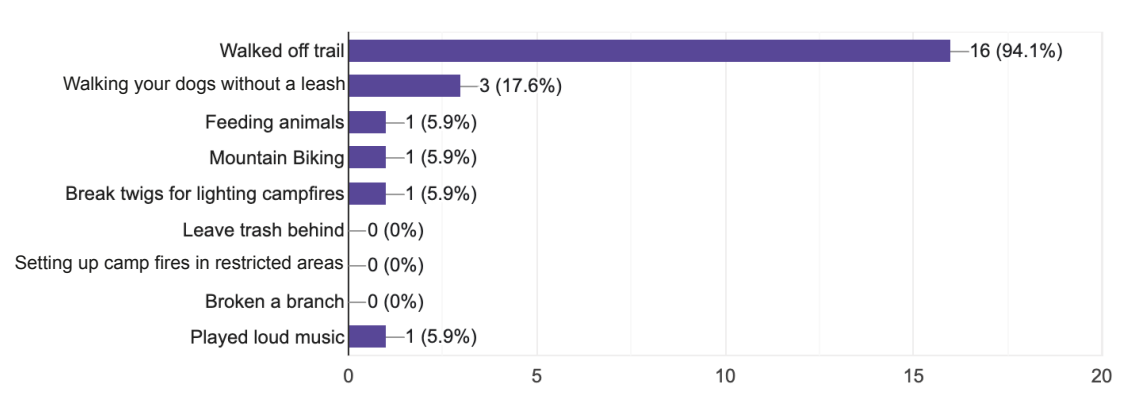
What are your motivations to visit Nuuksio or any other National park?

- Nature, blueberry picking
- Walking, fresh air, exercise
- Adventure, Scenery
- I like to go on hikes and Nuuksio has some great hiking trails.
- I mainly visit there to enjoy the nature and hike. Furthermore, I BBQ with my friends there.
- Going for nice walks
- I would love to visit in summer for sure.
- Nature, being outdoors, beauty, bbqs
- Nature trail, good times
- To see how good the trails are, how good the scenery is
- To feel the nature. Experiencing hiking with friends.
- Seeing nature and taking nice photos
- Relaxation, Picnic and BBQ outdoors
- Recreation, scenery, being with nature
- Hiking
- Enjoying nature, hiking, skiing, scouts activities
- To connect with nature, go hiking, and see new places in Finland
- To be in nature,
- To see and feel the nature
- To escape the city
- Beauty of nature, fresh air, activity and sport
- Being in nature makes you feel good, beautiful scenery, walking in nature is a nice way to exercise and unwind
- Being in the nature, swimming, hiking and sleeping in a tent.
- Nature, jogging and relaxing
- Nature walks
- To connect with nature, its good for anyones mental health and spirit
- Grilling ang have fun with friends

Appendix

- The clean air, green areas, good walking paths, and right next to the water
- The beauty of nature and fresh air
- To be immersed in natural resources and to have a unique experience
- Enjoying nature, relaxing
- Nature Berry and mushroom picking
- Nature

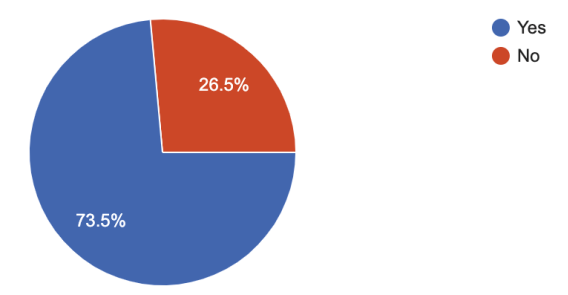
Have you participated in any of these activities during your visits to Nuuksio? You can choose multiple options.



If you engaged in any of these activities, specify what made you do so?

- I walked off trail since it was a more fun and quicker way to reach the destination.
- Getting lost
- We accidentally went off trail
- We got lost and had to walk off trail to find our way back faster.
- There were no other dogs or people around so we figured it was safe to let our dog walk off leash, as he is obdient and comes when called but enjoys running freely
- Orienteering or finding cool places
- I was picking mushrooms
- We got lost and wondered off the trail accidentally
- Sometimes it's nice to look for different view. Also as a child I would go on adventures and try to find where rölli lives and so one.
- Walking off trail to look around. Walking dog without a lease because there is no one else around plus the dog is calm
- If I m picking berries I need to go off trail
- Curiosity and feeling of freedom
- I have walked with a dog without a leash because there was no one in sight and I trusted my dog.
- I have also walked off trail because sometimes they took me closer and faster where I needed to go.
- Interest and fun
- Because they are allowed in Nuuksio.

Did you know that the activities listed above are harmful for biodiversity?

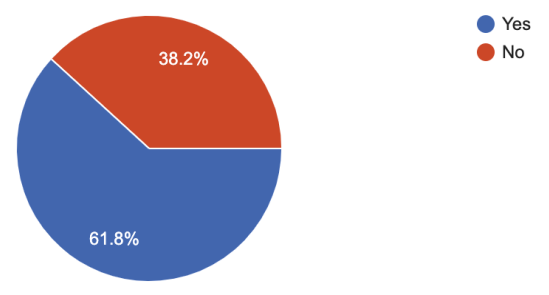


Appendix

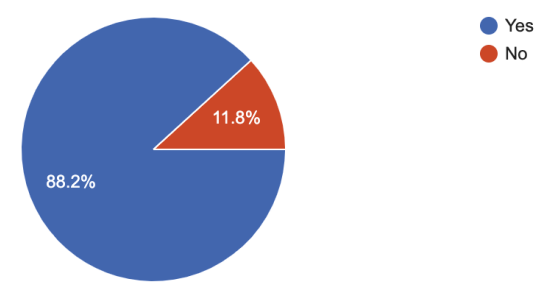
If you answered a no, would you still engage in these activities after knowing that they are causing harm to biodiversity?

•I would have answeres yes and no since i knew that those are harmful activities but walking off trail never occured to me as such
•If need be, yes but otherwise no
•Maybe
•No, I only knew that the other options were causing harm, so those i wouldn't be doing anyway
•No
•No
•Not intentionally
•Probably yes
•No
•No
•No

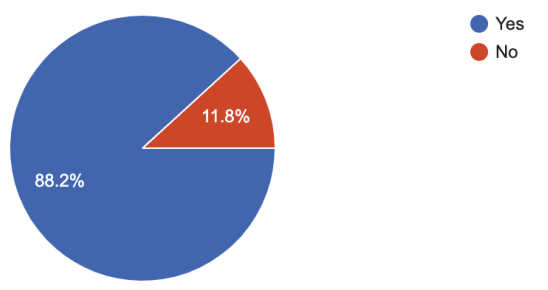
Were you aware that the rising number of visitors is causing a significant impact on biodiversity in Nuuksio?



Would you want to know more about the struggles of biodiversity in Nuuksio?

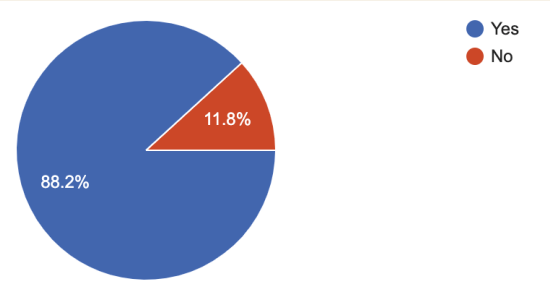


Would you like to know more about the local biodiversity in Nuuksio. e.g. the impact of your visit?

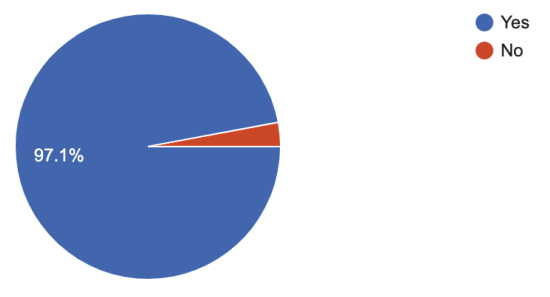


Appendix

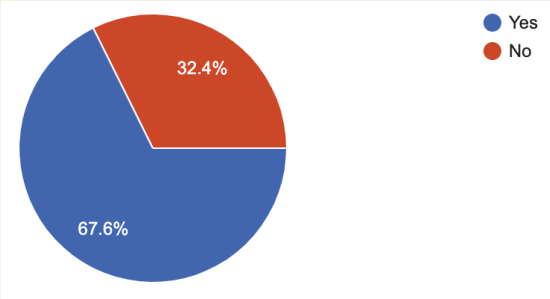
Would you want to take part in preserving the biodiversity in Nuuksio?



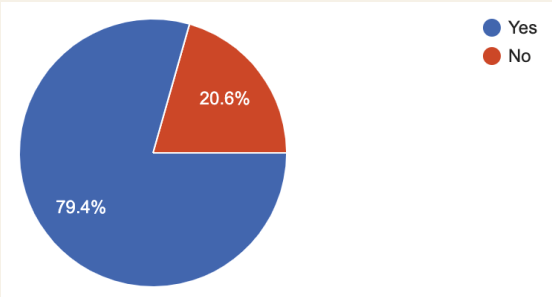
If you found that your actions were harming biodiversity, would you be encouraged to reduce your negative impact on biodiversity by observing your own behavior while visiting?



Would you want to participate in events such as educational nature walks about the local species in Nuuksio?

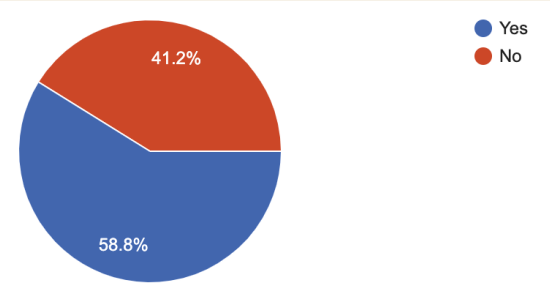


Would you want that there would be more events such as educational walks offered in Nuuksio to learn more about nature?

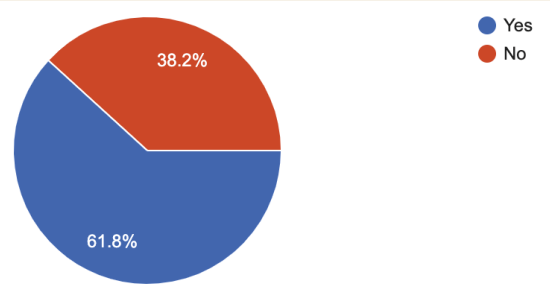


Appendix

Would you want to participate in events such as nature walks where you collect data e.g. documenting observations on a certain plant?



**After hearing about the problem and understanding your part in it,
Would you be motivated to be involved in sharing your ideas about biodiversity improvements in National parks?**



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