BENCHMARKING MEASURES FOR HANDLING POTENTIAL VISITOR PRESSURES IN PROTECTED AREAS; A CASE OF NORTH KARELIA BIOSPHERE RESERVE

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CBC SUPER: SUSTAINABILITY UNDER PRESSURE: ENVIRONMENTAL Resilience in natural and cultural heritage areas with intensive recreation

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CBC SUPER: SUSTAINABILITY UNDER PRESSURE: Environmental resilience in Natural and Cultural Heritage areas with intensive recreation



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### ABSTRACT

Protected areas have increasingly become popular environment for visitors seeking outdoor recreation and relaxation in recent years. This is also reflected in UNESCO test and model site of sustainable development, the North Karelian Biosphere Reserve. Sustainability of protected areas is achieved when tourism-specific planning and management systems of a region do not conflict with the site's conservation objectives. Economic instruments such as entrance fees are frequently proposed to regulate and manage visitor volume to vulnerable sites and nature in general. While being common in many countries throughout the world, it seems to have to an extent limited applicability in North Karelia, mainly due to the public rights of access.

In this report, trends and policies affecting management of North Karelia Biosphere Reserve as a protected area are investigated, after which examples of best practices and series of indicators that could be applicable in handling potential visitor pressures across the Biosphere Reserve are offered.

Results show that trends and policies that affect management are known. However, destination specific rules and regulations are rather fragmented, mainly when considering visitor pressures where numbers may rise to millions by 2050. The visitor segmentation already defines in detail the characteristics of North Karelia Biosphere Reserve visitors to protected area environments under Metsähallitus management i.e. National Parks and Hiking Area. Besides the National Parks and Hiking Areas, no similar data except for visitor origins exist, even through visitors are also entitled to exercise public access rights in buffer zone environments outside but adjacent to protected areas. The hiking routes extending beyond the National Parks and connecting one park to the next are important development assets for tourism as activities also extend to areas outside the National Parks and Hiking Area.

In circumstances of abrupt visitor flow, or large influx of visitors favoring similar environments as is presently, a more diversified management approach for environmental pressures (e.g. congestion, trampling, pollution, biodiversity loss, and conflicts with residents) both inside the National Parks and Hiking Areas, and most importantly on surrounding environments outside the National Parks within the Biosphere Reserve buffer zone and core areas will be needed.

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## 1. INTRODUCTION

Protected areas are gaining popularity as environments for visitors seeking outdoor recreation and relaxation in form of nature-based tourism<sup>1</sup>. This is also reflected in Nordic countries with increasing, and sometimes rapid growth of visitor numbers to protected areas<sup>2</sup>. Biodiversity in terms of the number of valuable habitats and species and landscape qualities have been observed as key pull factors for National Parks<sup>3</sup>.

Pull factors are attributes that attract visitors to specific heritage places, unique natural landscapes, to practice specific activities, or to attend specific events<sup>4</sup>. Support infrastructures such as cabins for rest, marked trail network, and National Park centres as a major information source are stated as key motivation features<sup>5</sup>. Natural characteristics of parks, recreation facilities and services inside a park, tourist services in surrounding communities, secure environment, as well as the park's location in relation to the population are other factors associated with the number of visits<sup>6</sup>. Some research have demonstrated that recreation opportunities, the number of biotopes, the provision of trails and the park's age increase the number of visits, while the park location in relation to the population only has a significant effect<sup>7</sup>.

On one hand, protected areas popularity is increasing. On the other hand, sustainability can only be achieved when tourism-specific planning and management systems of a region take full account of present and future economic, social, and environmental impacts<sup>8</sup>. This means the visitor pressures are under control, and that the interests of visitors, the industry, the environment, and host communities are accordingly balanced against each other. In other terms, the recreational use of protected area environments need not conflict with the site's conservation objectives.

Puhakka (2008) discusses the various discourses about the purposes of National Parks<sup>9</sup>. The first as aiming to protect nature, not satisfy recreational or other human needs (e.g. economic). The second as based on the idea to satisfy humans' needs hence integrates an economic aspect; with protection as not ecological but aesthetic and preserved as natural sights and recreation areas. The third combines elements from the previous two, with the conservation goals of parks as primarily defined with natural scientific criteria (integrate the ecological goals of nature conservation), but that the parks also strive to develop sustainable tourism by implementing economic goals of nature-based tourism in National Parks. This last discourse pays attention to environmental impacts of tourism and considers the problems by implementing the principles of sustainable tourism (Table 1). Here, sustainable

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<sup>&</sup>lt;sup>1</sup> Siikamaki et al. 2015., Heinonen, 2007.

<sup>&</sup>lt;sup>2</sup>Nordic Council of Ministers 2019.

<sup>&</sup>lt;sup>3</sup> Siikamaki et al. 2015.

<sup>&</sup>lt;sup>4</sup>Haukeland, Veisten, & Grue, 2010., Kim et al., 2003., Tverijonaitea, Ólafsdóttira, & Thorsteinsson, 2018.

<sup>&</sup>lt;sup>5</sup>Sirakaya and McLellan 1997. Garms et. al 2017., Price and Maureen.,

<sup>&</sup>lt;sup>6</sup>Neuvonen et. al 2010., Tyrväinen et. al 2016., Naumanen 2020b.

<sup>&</sup>lt;sup>7</sup>Neuvonen et. al 2010. Nerg et. al 2012.

<sup>&</sup>lt;sup>8</sup>Silvennoinen 2016.

<sup>9</sup> Puhakka R 2008.

tourism refers to last discourse, to the term used by Metsähallitus that has drafted Principles of Sustainable tourism in protected areas and developed indicators to measure sustainability<sup>10</sup>.

**TABLE 1.** Compatibility/ suitability of forms of tourism with IUCN's Protected Area Management Categories (adapted from Lawton, 2001). Ecotourism uses: Hard=stronger environmental commitment, Soft=moderate environmental commitment.<sup>11</sup>

IUCN protected area category	Matrix for (1= Prima 3= Potent		ECOTOURISM USES <sup>13</sup>							
	Preser- vation of species and bio- diversity	Wilder- ness protec- tion	Protec- tion of specific natural / cultural features	Sustain- able use of resources from nat- ural eco- systems	Mainten- ance of cultural / trad- itional attrib- utes	Tour- ism & recrea- tion	Scien- tific re- search	Hard	Soft	Other forms
Ia Strict Nature Reserve: Protected area managed mainly for science	1	2	n/a	n/a	n/a	n/a	1	no	no	no
Ib Wilderness Area: Protected area man- aged mainly for wil- derness protection.	2	1	n/a	3	n/a	2	3	yes	no	no
II National Park: Protected area managed mainly for ecosystem protec- tion and recreation	1	2	2	3	n/a	1	2	yes	yes	no
III Natural Monu- ment: Protected area managed mainly for conservation of specific natural features	1	3	1	n/a	n/a	1	2	yes	yes	no
IV Habitat/Spe- cies Management Area: Protected area managed mainly for conservation through manage- ment intervention.	1	3	3	2	n/a	3	2	yes	yes	no
V Protected Land- scape/Seascape: Protected area managed mainly for landscape/ seascape conservation and recreation	2	n/a	1	2	1	1	2	no	yes	yes
VI Managed Resource Protected Area: Protected area managed mainly for the sustain- able use of natural ecosystems.	1	2	3	1	2	3	3	no	yes	no

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<sup>10</sup> Metsähallitus 2016., Naumanen 2020., Puhakka R 2008.

<sup>11</sup>Weaver and Lawton 2002 in Lemelin 2007.

<sup>12</sup> Bacsi Z, Tóth É 2019., Lawton 2002 in Lemelin 2007., IUCN, 1994., Eagles et. al 2002.

Nature-based tourism in protected areas is an ecosystem service that visitors enjoy. At the same time, it can also exert pressure on ecosystem. Visitors tend to have low pre-existing knowledge of how to behave in nature<sup>13</sup>. The growth and concentration of visitors in popular attraction sites can result in crowding, environmental damage, costly rescue operations and overload on public infrastructure<sup>14</sup>. Similarly, park managers can also lack an understanding of the spatial distribution and ecological impact of visitor pressures<sup>15</sup>. Economic instruments such as entrance fees are frequently proposed to regulate and manage visitor volume to vulnerable sites and nature in general. While being common in many countries throughout the world, economic policy instruments seem to have to an extent limited applicability in countries with public rights of access<sup>16</sup>.

The growth of nature-based tourism is also reflected in popularity of Finnish National Parks as important tourist attractions and environments for visitors seeking outdoor relaxation and recreation<sup>17</sup>. According to Visit Finland, nature which includes forests, lakes, rivers, National Parks, snow, ice, northern lights, and the midnight sun is a main driving force for Finnish tourism, and main pull factors for visitors to Finland<sup>18</sup>. In the end of 2017 and 2018, the visitor numbers for Finnish National Parks were 3.1 million and 3.2 million respectively, compared to just 771,000 in 2001 (see figure 1).



FIGURE 1. Annual visitor numbers to Finnish National Parks.<sup>19</sup>

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- <sup>13</sup>Nordic Council of Ministers 2019.
- 14 Nordic Council of Ministers 2019., IUCN 2015.
- <sup>15</sup> Chun et al 2020., Watson et al., 2014.
- <sup>16</sup>Nordic Council of Ministers 2018., Øian et. al 2018.
- <sup>17</sup> Metsähallitus 2019.
- <sup>18</sup> Visit Finland 2018.
- <sup>19</sup> Metsähallitus 2020.

Pallas-Yllästunturi National Park (EUR 61.5 million), Urho Kekkonen National Park (EUR 36.6 million), Koli National Park (EUR 21.5 million), Oulanka National Park (EUR 18.8 million), and the Pyhä-Luosto National Park (EUR 13.3 million) were the most important parks in Finland in terms of local economic impact by National Park visits in 2017<sup>20</sup>. Out of all these, Koli National Park that lies within North Karelia Biosphere Reserve is the smallest in terms of area, hence susceptible to visitor pressures.

No. of visitors (annual)	Pallas-Ylläs (1020km <sup>2)</sup>	Pyhä-Luosto (142 km²)	Urho Kekkonen (2 550 km²)	Oulanka (270 km²)	Koli (30km²)
2009	419 000	128 000	289 000	165 500	127 500
2010	436 000	119 000	287 500	169 000	138 500
2011	435 500	118 500	277 000	171 500	134 500
2012	473 000	109 500	300 400	162 400	125 600
2013	488 400	n/a	292 600	174 600	140 600
2014	514 800	101 600	288 600	179 600	135 200
2015	525 600	115 100	291 700	201 200	167 300
2016	538 800	153 000	295 000	200 600	181 100
2017	553 000	149 100	334 700	199 000	203 400
2018	549 200	174 400	340 500	199 500	190 900
2019	561 200	169 700	367 000	189 300	201 800

TABLE 2. Finnish National Park visitor numbers 2009–2019

Biosphere Reserves are UNESCO test and model sites of sustainable development. These sites possess unique characteristics; the major one being the sensitivity of their natural environments, mainly protected areas "core areas", to human impacts and climate-change driven pressures. Biosphere Reserves are thereby designed to facilitate more participatory, cross-boundary and integrated management<sup>21</sup>. This includes the limiting of tourism related pressures.



FIGURE 2. Key zone of Biosphere Reserves<sup>22</sup>.

<sup>20</sup> Erkkonen J 2018.
<sup>21</sup> Laven et. al 2015.
<sup>22</sup> UNESCO 2020.

### 1.1 NORTH KARELIA BIOSPHERE RESERVE AND ITS ROLE IN SUSTAINABLE TOURISM DEVELOPMENT

North Karelia Biosphere Reserve (NKBR) was established in the year 1992 as part of UNESCO Man and Biosphere Programme. Since the BR was established before 1996, it is considered part of "First Generation Biosphere Reserves" with the aim to support biodiversity conservation and applied scientific research<sup>23</sup>. Even though NKBR falls under first generation BRs, it has integrated the actions of the secondgeneration Biosphere Reserves as its primary function has been acting as a learning site for sustainable development in addition to its other functions<sup>24</sup>.

NKBR is situated in North Karelia province and consists – officially – Lieksa city, Ilomantsi municipality, and Joensuu city's Tuupovaara district (figure 3). North Karelian Biosphere Reserve consist protected areas of Koli, Patvinsuo and Petkeljärvi National Parks, Koivunsuo strict nature reserve, as well as Kesonsuo and Ruunaa nature reserves. All protected areas comprise of core area and buffer zone. The core areas aim to conserve different valuable habitats and species, among other old-growth forests, traditional landscapes, mire complexes, endangered species, and valuable wetlands of North Karelia province. The buffer zones surround or adjoins the core areas. Both environments are used for recreation and other activities that pays attention to related environmental impacts and consider environmental pressures.

Protected area	Core area (ha)	Buffer zone (ha)	Total (ha)
Kolin National Park	2780	205	2985
Patvinsuo National Park	10544	2482	13026
Petkeljärvi National Park	670	2747	3417
Koivusuo Strict Nature Reserve	2208	5353	7561
Kesonsuo Nature Reserve	1394	7371	8765
Ruunaa Nature Reserve	7357	4621	11978
Total area	24953	22779	47732

TABLE 3. North Karelia Biosphere Reserve protected areas.

North Karelia province recorded 279,949 overnights in 2019. In comparing the total visitor arrival to North Karelia province and total numbers to just one site (Koli National Park) for the year 2019 (201 800), it is evident that at least 72 % of visitors arriving to North Karelia also visit the Biosphere Reserve during their stay. Tourism is therefore the main activity within the BR's adjoining core area and buffer zone. Even though it includes protected sites, it does not only consist of protected areas. The area of the Biosphere Reserve that is not protected is called the transition area (commonly termed "area of cooperation").

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<sup>&</sup>lt;sup>23</sup>Reed, M., Price, M 2020.

<sup>&</sup>lt;sup>24</sup> First generation BRs were created without a Statutory Framework and charged with supporting biodiversity conservation and applied scientific research. Second-generation BRs primary function is sustainable development and were required to address the criteria of the 1996 Statutory Framework, and implement the published 1996, 2008, and 2017 Action Plans (Elbakidz et. al 2013).

It is inhabited, and economic activities take place<sup>25</sup>. The aim is that communities' foster socio-culturally and ecologically sustainable economic and human activities which extend to whole province.



FIGURE 3. Present border of North Karelia Biosphere Reserve after extension; consistsofficially - Lieksa city, Ilomantsi municipality, and Joensuu city's Tuupovaara district. The protected areas of the Biosphere Reserve are: A. Ruunaa Hiking and Conservation Area, B. Patvinsuo National Park, C. Koivusuo Strict Nature Reserve, D. Koli National Park, E. Kesonsuo Nature Reserve, F. Petkeljärvi National Park. Nature tourism activities take place mainly across adjoining core area and buffer zones of Koli, Patvinsuo and Petkeljärvi National Parks, and Ruunaa Hiking Area of the Biosphere Reserve. Map (Maanmittaulaitos/MML).

<sup>25</sup>NKBR 2020.

### 1.2 ONGOING TOURISM INFRASTRUCTURAL PLANS FOR BIOSPHERE RESERVE

This chapter gives an overview of ongoing plans for developing tourism sector across the Biosphere Reserve as these explain in general the reasons behind and aims of the study.

The National Parks and Hiking Area of the Biosphere Reserve are key targets for nature tourism in the province. The parks and the Hiking Area together with other nearby conservation areas consists a diverse and pristine natural environment that attract visitors to the region. On the other hand, since all these sites are located within the Biosphere Reserve, their recreational use need not conflict with the site's conservation objectives.

Though the number of visits to Petkeljärvi and Patvinsuo National Parks have been on the rise lately, Koli is still the most visited attraction site in the Biosphere Reserve (approx. 200,000/ year), thereby making it the most vulnerable to visitor pressures<sup>26</sup>. Ruunaa Hiking Area is also seen to inhibit potential for growth. Plans have already been made for Ruunaa Hiking Area and Koli National Park. The published Biosphere Reserve tourism plan presents the current needs, strategy and plans for 2020–2025 (for Koli NP till 2050)<sup>27</sup>. No plans have been made for Petkeljärvi and Patvinsuo National Parks. In considering the Biosphere Reserve as a single entity (i.e. hiking routes extend beyond the National Parks and connect one park to the next), and in the absence of data that proves otherwise, it can be assumed that the plans of Ruunaa and Koli can somewhat affect also Petkeljärvi and Patvinsuo National Parks.

**In Koli**, nature tourism development is seen both as a potential for regional growth, and a threat to its conservation values. The goal is to increase the tourism potential a tenfold by 2050 from the current numbers (201 800 in 2019) and, with it, undertake significant development of the area of influence that would have a positive impact on jobs and the population<sup>28</sup>. Some of the targets by 2050 as clarified in the report are:

- Improving the accessibility to the destinations and across the sites
- Ensuring all-year round activities
- 25 000 bed places by 2050
- Develop Koli's operations to all year-round for the international customer base

**In Ruunaa**, the aim is to increase the total visits from current 80,000/ year to 180,000 visits per year, and that the share of Ruunaa's outbound tourists is 30%. This means over double the current amount. Ruunaa Master Plan; the master plan for land use and nature tourism in the Ruunaa Hiking Area was completed in autumn 2019 (Finnish Consulting Group 2019). The development goals include:

- Year-round services
- Infrastructure to enhance services for international visitors
- An additional 460 beds to the area developing cooperation between entrepreneurs
- Improving accessibility

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<sup>27</sup> Ibid.

<sup>&</sup>lt;sup>26</sup> Naumanen 2020.

<sup>&</sup>lt;sup>28</sup> Sweco Environment Oy 2017, in Naumanen 2020.

- More multi-channel joint marketing
- Promoting digital and international sale
- State of infrastructure and service structure are able to meet the expectations of international visitors
- Improved networking between entrepreneurs
- Improved accessibility
- Implementation of joint marketing with product purchases available via digital channels

Clean and versatile nature of the Biosphere Reserve is seen as a basis for developing nature and wellness tourism in the region<sup>29</sup>. The hiking routes extending beyond the National Parks and connecting one park to the next are also important development assets for tourism as activities also extend to areas outside the National Parks and Hiking Area. Public access rights also give both visitors and residents the rights to enjoy outdoor pursuits regardless of who owns or occupies an area. This applies also to environments in other zones within the Biosphere Reserve outside National Parks, and Hiking Area.

Recent studies such as the combined analysis of SHAPE NPA and Freshabit LIFE IP surveys shows that visitors and residents land-use values are linearly aligned across the Biosphere Reserve with these values concentrated along hiking routes, waterbodies, and protected areas<sup>30</sup>. Metsähallitus surveys of North Karelia Biosphere Reserve environments show that popularity and demand for outdoor recreation has resulted in an increase in number of visitors to National Parks and Hiking Area of the Biosphere Reserve<sup>31</sup>. However, despite the increase in visitor numbers, there has not been any major environmental impacts across Biosphere Reserve environments studied<sup>32</sup>. Visitor impacts inside the NPs are largely under control and impacts on the state of environments both inside the NPs and surrounding areas within the Biosphere Reserve are also currently minimal, even though signs of climate change driven pressures such as ice cover on lakes exist<sup>33</sup>.

Presently, the Finnish National Park that attracts most visitors in the country (approx. 500, 000/yr.) is Pallas-Ylläs National Park. The park's area is 1020km<sup>2</sup> and its local economic impact is approx. 62M euros. On the other hand, Koli National Park (NP) situated in NKBR attracts approximately 200,000 visitors annually with National Park's area standing at 30km<sup>2</sup>, and local economic impact of approximately 22M euros. The hope is that by 2050, Koli NP would attract ten times more visitors, meaning at least 2million visitors a year. Nevertheless, there is no mention of any changes to size of the park which currently stands at 30km<sup>2</sup>. Therefore, the ongoing infrastructural plans and strategy (Biosphere Reserve tourism plan 2020) presents need for investigating gaps in handling potential visitor pressures across the Biosphere Reserve by 2050, under scenario that the stated visitor numbers are realised.

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<sup>&</sup>lt;sup>29</sup>Naumanen 2020.

<sup>&</sup>lt;sup>30</sup> Silvennoinen & Hokkanen 2018.

<sup>&</sup>lt;sup>31</sup>Synthesis of metsähallitus visitor surveys between 2009–2019 (ref. chapter on methods).

<sup>&</sup>lt;sup>32</sup> Silvennoinen & Hokkanen 2019., SUPER DPSIR.

<sup>&</sup>lt;sup>33</sup>Silvennoinen & Hokkanen 2018., Naumanen 2020.

## 2. AIM OF THE RESEARCH

The report aims at (a) identifying gaps and (b) providing examples and series of indicators of best practices that could be applicable in handling potential visitor pressures across protected areas of North Karelia Biosphere Reserve. In order to identify gaps, we investigate current state of management of environments and its ability to tackle potential visitor impacts under scenario that visitor numbers to the Biosphere Reserve grows according to the tourism plan come 2050 (i.e. from current average of about 300,000 annual visits, to approximately 2.5 million visits a year).

This is done by looking at trends and policies affecting the management planning of protected area tourism, and how these are considered in management of Biosphere Reserve environments. Sustainable management practices and tools that could be useful or applicable to managing potential visitor pressures on North Karelia Biosphere Reserve's natural environment are then investigated. This is done by benchmarking sustainable environmental management practices and measures that could be applicable to managing identified gaps to handling visitor pressures across the Biosphere Reserve protected areas.

The analysis focuses on the Biosphere Reserve protected areas (core areas and buffer zones) and their surroundings environments (i.e. Biosphere Reserve's area of cooperation). This is because both protected areas (i.e. the core areas and buffer zones), as well as surrounding environments within the Biosphere Reserve (buffer zones outside Metsähallitus management and areas of cooperation) are also accessible to visitors ( i.e. as part of every man's rights). The pressures and impacts from area of cooperation and buffer zones (outside Metsähallitus management) can directly or indirectly affect also the sensitive and protected environments of buffer zone and core area.

# 3. METHODS

A synthesis of visitor surveys of Koli National Park 2009–2019 (Tahvanainen et al. 2009., Koskeli-Ratamaa 2016., Naumanen, 2020), Ruunaa Hiking Area (Paulus, 2019), Patvinsuo National Park (Heikkilä 2008., Lampinen, 2016), and Petkeljärvi National Park (Korkalainen 2013., Pääkkölä, 2020), results of Freshabit LIFE IP project survey (31.10.2017–31.1.2018) and SHAPE NPA project survey (15.09.2018–15.12.2018) are scrutinized in sourcing information on current gaps in visitor management.

The Freshabit LIFE IP and SHAPE NPA project surveys were undertaken using maptionnaire map based public participation tool, whereby the linearity of values, meaning potential impact and pressure areas of the Biosphere Reserve protected area environments were analysed. The number of respondents to Freshabit LIFE IP project survey was 295 persons (included only domestic visitors and residents), while no. of respondents to SHAPE NPA project survey were 804 (included both international and domestic visitors, as well as residents). The maptionnaire allowed respondents to map value areas with the help of colour buttons, or alternatively drawing an area on the map. On the map, respondents were requested to point specific value areas, with an option for comments on the areas mapped. A follow-up questionnaire for acquiring more detail information on visitor uses of environments was attached to the maptionnaire.



FIGURE 4. Example of mapping values by use of maptionnaire.

For background data on best practices tools and examples, various methods are used. These have been sourced from scientific/ research articles, government documents, protected area websites and material banks (e.g. of National Parks, Ramsar sites, Biosphere Reserves, Regional Parks). Regional plans for North Karelia and protected area land-use and management plans have concurrently been scrutinized.

### 4. STUDY AREA AND KEY NATURE TOURISM ENVIRONMENTS

The Biosphere Reserve consists three National Parks and one Hiking Area which together form a significant nature tourism complex. The network consists areas of diverse nature, which enable a wide range of nature-based activities thereby creating a strong foundation for nature tourism in the area. The clean and versatile nature of the area is seen as a basis for developing nature and wellness tourism. Hiking routes extending beyond the National Parks connect one park to the next.

### 4.1. KOLI NATIONAL PARK

Koli National Park is located about 70 kilometers north of Joensuu, the capital of the province. The National Park can be reached either by car or by taxi. Other public transport **connections to Koli are however problematic**.

In winter, the ice road over Pielinen to Vuonislahti forms a connection to Lieksa, and in summer, the Suvi Express hydrofoil transports tourists across Pielinen. Car ferry traffic in Pielinen also started operating again in the summer of 2019.



FIGURE 5. Koli National Park

Koli's geology, its diverse habitats of endangered fauna and flora, meadows and other traditional landscapes left behind by traditional subsistence farming makes it an important protected area and tourist destination that preserves the natural heritage. Koli has a long history as a wilderness holiday destination, with the first tourist lodge and nature trail opened in 1896. However, it was not officially designated as a National Park until 1991.

The park's **80-kilometer-long marked trail** network offers excellent hiking opportunities. Trails suitable for day trips can be found largely in the vicinity of the park. Overnight hikers often head to the southern end of the park, winding a 30–60-kilometer trail in the rugged terrain surrounding Lake Herajärvi. About **6,600 hikers opt for the route every year**. The western part of the Herajärvi trail extends outside the National Park and by-passes the city of Joensuu and municipality of Kontiolahti. The park's trail network connects north to the UKK national hiking trail, which continues south through the Kolinpolku trail to Joensuu. Koli National Park ski trails are part of Koli's extensive trail network and the park's special features include the ski slopes within the park. **Wellness, sightseeing, hiking, skiing, and sports** are among other nature outdoor activities, important motives that attract visitors to the destination.

Koli's most popular site for visitors is the **summit of Ukko-Koli** hill that opens to Finland's most famous national landscape. Since its designation in 1991, notable increase in visitor numbers to the National Park has been experienced and the visitor **impacts are becoming more visible mainly during the peak summer months. In** 2019, 201, 800 visits were made to Koli National Park.

### 4.2. PETKELJÄRVI NATIONAL PARK

Petkeljärvi National Park was founded in 1956. It is located on the east side of Joensuu - Ilomantsi road, near the village of Möhkö close to the Finnish-Russian border. The **wild ridges and clear lakes formed during the ice age** are outstanding characteristic features of Petkeljärvi, Finland's easternmost National Park. This site hubs ridge formations, which extends from lake Koitere to the Russian side of the border. Enchanting views of the clear lakes and forest ponds open above the narrow ridges. Stunning view of striking, shield bark covered pine trees dress its pristine forests. The black-throated diver, the park's flagship animal, nests in the wilderness lakes, and in the terrain one can spot the traces of a beaver.

The wild nature of the area is underlined by animals that thrive in the park, such as beavers, ravens, and the black-throated diver (the emblem bird of the park). The **park's forests have remained untouched** by the forest industry with 150-year-old shield bark covered pines as the oldest trees in the park area. Species that need dry, warm conditions thrive in this National Park, with fen meadows preserved as part of the traditional landscape. Deterioration of the terrain on the ridges of the park can prove problematic, since the flora of the dry heath soil easily suffers when it is stepped on.

The park is well suited for **day hikes** or as starting point of longer hiking journey. Petkeljärvi camping centre is situated in the middle of the NP. It provides accommodation, food, sauna and equipment rental (canoes, boats). The park consists **nature trails, crosscountry skiing trails**, and **canoe and boating routes**. There are two ring-marked trails in the National Park; 6.5-kilometer long Kuikan kierros trail leads through through the mires along the boardwalk with varying landscapes up and down the ridges.



PHOTO 1. Petkeljärvi National Park (©Möhkön manta)

The formation of the ridges can be explored by taking the 3.5 km harjupolku trail. The oldest hiking route in North Karelia, 31 km long Taitajan taival, also starts from Petkeljärvi and ends at Mekrijärvi village. Apart from hiking, one can also paddle and row in the National Park. From Petkeljärvi it is possible to paddle all the way to lake Koitere and Patvinsuo National Park along river Koitajoki; a 200 km long river that meanders back and forth across the borders of Finland and Russia. In 2019, a total of **19,400 visits were made to Petkeljärvi National Park**.

### 4.3. PATVINSUO NATIONAL PARK

Patvinsuo, located 105 km<sup>2</sup> north of Koitere-Ilomantsi, is the largest National Park in North Karelia. Its extensive marshland with long wooden boardwalks offers an excellent opportunity to get acquainted with the bog typical to southern Finland as well as the open north wilderness setting.

Patvinsuo is well suited for **self-guided hiking and wilderness nature observation**. Suomunjärvi with its sandy beaches offer a great **kayaking** destination, with possibility to rent canoes and boats from the nature centre. The nature centre is located at the heart of Patvinsuo National Park. It has a hiking information point and a free exhibition about the site's nature. One can also order paid guided tours for groups. Food services, a small kiosk and accommodation can be easily sourced from the nature centre. There is a camping area close to the centre, and in summer, the Suomu beach sauna is available for rent.



FIGURE 6. Patvinsuo National Park.

The park has about **80 km of marked trails** and 3–25km of nature paths, most of which are easy to navigate. In the marsh and wetland areas, one can hike along the boardwalk. Along Suomunkierro and Patvinkierro trails that surround lake Suomunjärvi, one has the possibility to stop at Teretinniemi bird tower or the Lahnasuo bird stage to view the various species of vertebrates. The number of visits to the Patvinsuo has been slowly increasing and in 2019 **16,600 visits was recorded**.

### 4.4. RUUNAA HIKING AND CONSERVATION AREA

The key natural feature of Ruunaa Hiking Area is **lake Lieksanjoki**, through which rapids flow. The area is a popular **fishing**, **canoeing**, **and hiking**, and is located on the east side of the Joensuu–Lieksa–Nurmes road, about 30 km east of Lieksa. Ruunaa area is also home to a diverse fauna. There, one can spot all the large carnivores of Finland, with bear as the most common. Wildlife stocks have been growing recently. There is also a small number of deer herd in the nearby environments. The forests and water bodies of the region are home to a diverse species of birds.

Ruunaa rapids are the **most important recreational fishing environments in Southern Finland**. In addition, the site has an excellent setting for rafting, both for experienced paddlers looking for a challenge and for beginners looking for a guided experience. By the end of February 2020, there were about 30 km of maintained trails across Ruunaa. There, one can go on short cross-country ski runs or multi-day wilderness walks with overnight stay in tent or shed. About **80,000 visits are made**  there every year, most of it during the summer season. An unobstructed 650-meterlong boardwalk takes one from the Neitikoski car park to the lake Neitikoski, with an unobstructed access also to the hiking center in the area. Ruunaa hiking center offers a wide range of hiking advice and guidance. The center has a restaurant and provides accommodation services. In addition, one can buy fishing permits, camping equipment and maps from the shop.

There is a total of about **50 kilometers of trails across Ruunaa site**, and the lengths of the ring routes vary from three to thirty kilometers. The 133 km long provincial hiking trail Karhunpolku leads one from the border of Lieksa and Kuhmo to Patvinsuo National Park through the Ruunaa Hiking Area and the western part of the Ruunaa nature reserve. The Ruunaa Hiking Area was chosen as the excursion site of the year in 2009 and was the first excursion destination of the year managed by Metsähallitus. **In 2019, 78,000 visits were made to the Ruunaa Hiking Area**.



FIGURE 7. Ruunaa Hiking and Conservation Area.

### 5. TRENDS AND POLICIES AFFECTING THE MANAGEMENT PLANNING OF PROTECTED AREA TOURISM

Protected areas play an important role in conservation and protection of biodiversity and wild habitats<sup>34</sup>. The effectiveness of rules and regulations is important consideration for their management, while regular intervention, political commitment, and effective governance are essential for the sustainability of protected area environments<sup>35</sup>. Setting standard-based management frameworks driven by protected area values, management objectives and their associated indicators and standards is similarly essential. This chapter investigates how trends and policies influence the current and future management of North Karelia Biosphere Reserve as a protected area.



FIGURE 8. Trends and policies affecting planning of tourism in protected areas.

### 5.1. DESTINATION SPECIFIC RULES AND REGULATIONS

Economic instruments (e.g. taxation incentives, penalties, access/entry fees) have increasingly been taken into use as a way of responding to the unprecedented increase in visitation to certain vulnerable protected areas and sites. However, utilizing these kinds of instruments have been found particularly challenging in sites like North Karelia Biosphere Reserve, due to how the freedom to roam and traditional open access have been transformed into public access rights<sup>36</sup>.

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<sup>&</sup>lt;sup>34</sup> Poikolainen et. al 2019.

<sup>&</sup>lt;sup>35</sup> Price and Maureen., Nordic Council of Ministers 2019.

<sup>&</sup>lt;sup>36</sup> Kaltenborn and Sandell, 2001; Sandell, 2006a/2006b, Sandell and Svenning, 2011; Øian and Skogen, 2016; Nordic Council of Ministers 2018.

North Karelia Biosphere Reserve environments consist of (a) protected areas, also known as core areas and buffer zones, and (b) area of cooperation. The protected areas are further classified into two classes; I. Strictly protected sites with no economic activity allowed, and II. Protected areas with economic activities allowed but restricted through a mix of international, national, and regional regulations<sup>37</sup>. National parks and Hiking Area fall under category "II" protection. Being a Biosphere Reserve consisting three National Parks and a Hiking Area, a mix of international, national and regional management plans indicate the areas to be protected, used, and developed. The management of environments e.g. National Parks, Hiking Area and across the Biosphere Reserve's area of cooperation are also defined.

nomination form 1989, Rannikko et. al 1997)	(according to designat							
BR area	790 745 ha							
Area of cooperation	743 013 ha	94%						
Protected area Buffer zone Core areas Patvinsuo National park Petkeljärvi National park Koli National Park Koivusuo strict nature reserve Kesonsuo nature reserve Ruunaa Conservation Area	47 732 ha 22 779 ha 24 953 ha (13 026 ha) (3 417 ha) (2 985 ha) (7 561 ha) (8 765 ha) (11 978 ha)	6%						
Land ownership types State, Co-operations, Private landowners, Other entities								
Tasks (Designated areas of action)	Importance (5-Important, 0-not important)							
Protection of natural or sparsely damaged ecosystems	5							
Long town anying monthly any itaning	5							
Long-term environmental monitoring	5							
Integrated promotion of rural development and regional planning	5							
Integrated promotion of rural development and regional planning In situ conservation of genetic resources	5							
Integrated promotion of rural development and regional planning In situ conservation of genetic resources Experimental and problem-oriented research on ecosystem management and protection	5 5 4 4							
Integrated promotion of rural development and regional planning In situ conservation of genetic resources Experimental and problem-oriented research on ecosystem management and protection Promoting local participation in land use decision-making	5 5 4 4 4							
Integrated promotion of rural development and regional planning In situ conservation of genetic resources Experimental and problem-oriented research on ecosystem management and protection Promoting local participation in land use decision-making Promoting environmental education and training for local and non-local actors	5 5 4 4 4 4 4 4							
Integrated promotion of rural development and regional planning In situ conservation of genetic resources Experimental and problem-oriented research on ecosystem management and protection Promoting local participation in land use decision-making Promoting environmental education and training for local and non-local actors Biosphere Reserve protection related content preparation and dissemination	5 5 4 4 4 4 4 4 4							

TABLE 4. Biosphere Reserve area and tasks

<sup>&</sup>lt;sup>37</sup> The founding document (UNESCO, North-Karelia biospehere reserve Nominati-on form, 1989) defined four core areas for the North Karelian Biosphere Reserve. Patvinsuo and Petkeljärvi National Parks, Koivusuo strict nature reserve and privately protected Kesonsuo nature reserve. The core areas are located on state lands, with the exception of the privately owned Kesonsuo nature reserve (Eisto E 2009).

Even though public access rights allows access to anyone living in or visiting the Biosphere Reserve the freedom to roam the countryside, forage, fish with a line and rod, and enjoy the recreational use of natural areas irrespective of who owns the land, the most biodiverse areas are usually protected, and pose restrictions such as on hunting, fishing, and forestry<sup>38</sup>. This applies to everyone including domestic and international National Park visitors, and companies from outside the province that bring visitors to the Biosphere Reserve. The Biosphere Reserve is involved in land-use planning of biosphere environments. However, protected areas are mainly on state-owned land and managed by Metsähallitus nature services.

The management and land use planning of protected areas in Finland (i.e. National Parks and protected areas) have for over a decade been directed by the discourse of protected area as sustainable nature-based destination<sup>39</sup>. The discourse pays attention to the environmental impacts of tourism and aims to solve impacts and potential pressures by implementing sustainability principles as used by Metsähallitus who has drafted Principles of Sustainable Nature Tourism in Protected areas, and developed indicators to measure sustainability using Limits of Acceptable Change (LAC) method<sup>40</sup>.



FIGURE 9. Land rights and management across NKBR\*

Metsähallitus is tasked with managing natural environments, mainly within protected areas i.e. National Parks and Hiking Areas (including conservation objectives)<sup>41</sup>. These include structures that support and guide mobility within and across the sites (e.g. hiking trails and lean-to), as well as customer communication and information dissemination aimed at increasing awareness and understanding the values of natural heritage of the areas, and related protection efforts. Creating conditions for sustainable recreational use of protected areas include providing a framework and guidelines for visitors, as well as conducive operating conditions for nature tourism companies in the area<sup>42</sup>. The key decisions for the use of the areas are made in accordance with the management and use plans, and the nature tourism plan serves as a complementary plan for the development of recreational use and nature tourism within the Biosphere Reserve designated area<sup>43</sup>.

<sup>. . . . . . . . . . . . .</sup> 

<sup>&</sup>lt;sup>38</sup> Heinonen, 2007., Metsähallitus 2019.

<sup>&</sup>lt;sup>39</sup> Puhakka 2008.

<sup>&</sup>lt;sup>40</sup> Heinonen 2007:306., Kajalaet al.2004., Puhakka 2008., Naumanen 2020. Puhakka R 2008.

<sup>41</sup> Puhakka R 2008.

<sup>&</sup>lt;sup>42</sup> Metsähallitus 2019.

<sup>&</sup>lt;sup>43</sup>Naumanen 2020.



FIGURE 10. Interlinkages between management and uses of core and buffer zones environments of North Karelia Biosphere Reserve. The smaller sysmbols on the upper legend shows values and potentials (culture, nature, recreation, social space) as marked by visitors (SHAPE NPA/ Freshabit LIFE IP project surveys).

In areas not under Metsähallitus management, routes are maintained by municipalities, associations, and other actors (e.g. private landowners and Biosphere Reserve actors). These complement the areas managed by Metsähallitus. Landowners are accountable for management of their lands and forests<sup>44</sup>. Due to the fragmentation in regulations and rules regarding management and responsibility of uses, the Biosphere Reserve plays a role in promoting responsible tourism development and sustainability mindset for all users of environments, meaning also for environments outside the protected areas but within the Biosphere Reserve. This is because despite the land owners bearing the primary responsibility of management of their forests and land, visitor and resident (i.e. due to public access rights) are allowed to freely roam and can concurrently create pressures for Biosphere Reserve environments.

#### STEERING COMMITTEE (16 + secretary)

- Municipalities
- Metsähallitus (1)
- University (2)
- Regional council (2)
- University of applied sciences (1)
- Nature protection (1)
- Other educational institution(1)
- Finnish Environment Institute, ELY-Centre (3)
- Companies (3)

#### WORKING GROUP

- (8 + secretary)
- Chairperson (University of Eastern Finland)
- Lieksa municipality
- Ilomantsi municipality
- Joensuu municipality
- Tourism company
- Metsähallitus
- Finnish Forest Centre
- University of applied sciences
- Secretary (ELY-Centre)

FIGURE 11. Example of North Karelia Biosphere Reserve Steering Committee representation (participation is voluntary).

The conservation initiatives and sustainable nature tourism planning for protected and Hiking Areas are done in collaboration with key stakeholders like Metsähallitus (e.g. through projects), collaboration with service providers (e.g. through exchange and transfer of ideas and knowledge on sustainability via study tours to other Biosphere Reserves, regional seminars and partnership agreements), and collaboration with governance and research institutes in the region (e.g. in research and development). As the Biosphere Reserve is located right at the border, the development of the Green Belt of Fennoscandia, an instrument for developing research and nature conservation cooperation for existing and planned protected areas along and across the borders of Finland, Norway and Russia is part of biosphere activities. The Green Belt of Fennoscandia refers to the network of protected areas on both sides of the border from the Gulf of Finland to the Barents Sea and related projects.

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<sup>&</sup>lt;sup>44</sup> Finlex 2020a., Finlex 2020b., Finlex 2020c., Finlex 2020d.

### 5.2. VISITOR SEGMENTATION

It is important to study consumer motivations, values and uses of environments. They offer a starting point for understanding areas of potential visitor pressures e.g. use levels. Visitor segmentation can help managers predict behaviour and plan for the behaviours. For example, segmentation by perceived product benefit can be used to develop an understanding of what tourists really seek in a visit to a protected area, and thereby help establish an appropriate management response. **Exploiting visitor segments by comparing and matching them with the biophysical and cultural attributes of a park can help reduce adverse impacts by target marketing, and sensitively promoting appropriate protected area attributes to the various visitor types<sup>45</sup>. Therefore, we look at how visitor segmentation is considered in North Karelia Biosphere Reserve.** 

Methods	Variables	Gained knowledge
Geographic characteristics	Origins of visitors, distance from sites, modes of transportation	Knowledge of the area (locals/domestic/ international)
Socio-demographic characteristics	Age, gender, occupation, income level, level of education	Characteristics and activity participation.
Psychographic segmentation	Seeking adventure (more active/risk) OR slow adventure (seeking slowness, relaxation)	Potential age group, products and services of interest, uses of environments
Activity participation	Various activities (e.g. camping, wildlife watching, hiking, Kayaking/canoeing)	Segments are easily identifiable, identifying key activities and potential uses of environments
Frequency of participation	Frequent travellers, repeat visitors, first-time visitors	Knowledge of protected area, value areas
Perceived product benefit	Socialize (e.g. spending time with family/ friends), silence, learning	Product characteristics and preferences

TABLE 5. Visitor segmentation trends.

### 5.2.1. Geographical characteristics of NKBR visitors

Geographical characteristics of visitors to Biosphere Reserve protected areas (i.e. National Parks and Hiking Area) is generally documented. It is known that approximately 340,000 visits are made to the protected areas managed by Metsähallitus in the province every year. Most visits are realised in attraction sites of Koli NP (leading site i.e. most visited), Patvinsuo NP and Petkeljärvi NP, as well as the Ruunaa Hiking Area.

In 2019, North Karelia recorded 279,949 arrivals<sup>46</sup>. In comparing the total arrival numbers to just Koli National Park for the year 2019, approximately 72% of visitors that visited North Karelia also visited the Biosphere Reserve during their stay. Foreign overnights by domestic visitors (including residents), and international visitors constituted 88.5% (247,644) and 11.5% (32,305) respectively. Out of these, 205,944 (domestic visitors) and 7,610 (international visitors) visited the Biosphere Reserve, meaning 83% of all domestic visitors, and 24% of all international visitor arrivals in North Karelia visited the Biosphere Reserve.

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<sup>&</sup>lt;sup>45</sup> Eagles et. al 2002.

<sup>&</sup>lt;sup>46</sup> Statistics Finland, 2020.

On average, domestic visitors account for 80% of arrivals to **Patvinsuo National Park**, 8% residents from the surrounding area and 12% international visitors. Domestic visitors arrived mainly from Joensuu (28%), Lieksa (7%), Kontiolahti (7%) or Helsinki (6%).

Visitor distribution	Doi (80	nestic ,75%)	Res (10	idents ,75%)	International (8,5%)		
acrosssilles	%	numbers	% numbers		%	numbers	
Koli (201 800)	73 %	147,314	16 %	32,288	11 %	22,198	
Ruunaa (78 000)	81 %	63,180	12 %	9,360	7 %	5,460	
Patvinsuo (16 600)	80 %	13,280	8 %	1,328	12 %	1,992	
Petkeljärvi (19 700)	89 %	17,533	7 %	1,379	4 %	788	
Totals (average)	80,75%	194,855	10,75%	11,089	8,5%	7,610	

TABLE 6. Visitor distribution across Biosphere Reserve (synthesis of Metsähallitus visitor surveys 2009–2019).

In Koli National Park, 73% of arrivals are domestic, 16% residents, and 11% international visitors. Domestic visitors mainly arrive from Helsinki (13%), Joensuu (8%) or Kuopio (5%). The largest number of foreign visitor arrivals are from Russia (3%) and Germany (3%). Visitors to **Petkeljärvi** National Park consists 89% domestic visitors, 7% residents of the surrounding area, and 4% international visitors. Domestic visitors mainly arrive from Joensuu (21%), Helsinki (13%) or Ilomantsi (7%).

The visitors' places of origin (cities for domestic segment, and countries for international segment) are also accessible to Biosphere Reserve managers as these have been yearly recorded and data available e.g. from statistics Finland (see appendix 1). No data exists on visitors that take time to exercise public access rights in other Biosphere Reserve areas outside National Parks and Hiking Areas. However, transportation is known as problematic for all Biosphere Reserve sites as arrival are mainly by own car (in all sites) or shared taxi (in Koli)<sup>47</sup>. Largest group of international visitors in 2019 originated from Russia, Germany, Sweden, Netherlands, Switzerland and United Kingdom<sup>48</sup>.

#### 5.2.2. Socio-demographic characteristics of NKBR visitors

**Koli** attracts more females (55%) than male (45%). In **Patvinsuo** and **Petkeljärvi**, the gender distribution is like Koli. In **Ruunaa**, more males (57%) than female (43%) visit the site. More than half of the visitors to Koli and Petkeljärvi possess a university degree. The gender distribution of visitors across all sites are quite even for both genders.

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<sup>48</sup>See appendix 1.

<sup>&</sup>lt;sup>47</sup> Synthesis of Metsähallitus studies 2009–2019.

TABLE 7. Gender distribution.

Gender distribution	KoNP		RuHA		PaNP		PeNP	
(female-male respectively)	55%	45%	43 %	57 %	54 %	46 %	52%	48%
Average age (female-male respectively)	42yrs	45yrs	47yrs	46yrs	45yrs	46yrs	51yrs	49yrs
Level of education	55%: a bachelor's or master's degree		34 %: a bachelor's or master's degree		47 %: a bachelor's or master's degree		55 %: a bachelor's or master's degree	

#### 5.2.3. Psychographic segmentation

Even though conditions exist for year-round tourism in the province, more than 60% of overnights are currently registered between May and October, with July and March as peak summer and winter season respectively. In winter, the share of visits from residents is higher than in summer. In summer, the share of domestic tourists is slightly higher than in winter. The share of international visitors is higher in summer than in winter.

TABLE 8. Distribution by season of visit.

VISITOR TYPES	Koli (KoNP)		Ruunaa (RuHA)		Patvinsu	o (PaNP)	Petkeljärvi (PeNP)		
	Winter	Summer	Winter	Summer	Winter	Summer	Winter	Summer	
Domestic	69 %	77 %	-	81 %	-	80 %	-	89 %	
Residents	23 %	9 %	-	12 %	-	8 %	-	7 %	
International	9 %	14 %	-	7 %	-	12 %	-	4 %	

According to a visitor survey conducted in 2019, the most popular activities in **Koli National Park** are **enjoying nature**, **landscape watching and hiking**. Little over a fifth of the visitors also get acquainted with the cultural heritage in Koli. During their visit, **visitors hike for about 10 kilometers** or **ski for about 6 kilometers**. Many have also calculated the distance "skied" on the ski slopes. Within the Biosphere Reserve, downhill skiing is only possible in Koli National Park, a feature that makes it stand out in popularity from the activities of other parks (10% of visitors)<sup>49</sup>. Hence it can be concluded that visitors to Koli are a mix of adventure seeking and slowness and relaxation in summer. However, in winter, the site attracts mainly adventure seekers (skiing and hiking).

**Petkeljärvi** visitor survey conducted in 2018, states the most popular activities by visitors at site as **walking and enjoying nature**. **Landscape viewing and wildlife watching** are also popular activities in Petkeljärvi. Activities in the site include visiting a café, renting a sauna and, to some extent, kayaking. During their visit, **visitors hike about 9 km, cycle 50 km, paddle 9 km, or row 4 km<sup>50</sup>**. The site is hence favored by adventure-seeking visitors.

<sup>. . . . . . . . . . . . .</sup> 

<sup>&</sup>lt;sup>49</sup>Naumanen 2020b.

<sup>50</sup> Pääkkölä 2020.

According to a visitor survey conducted in 2013<sup>51</sup>, the most popular activities for visitors in **Patvinsuo** favor slowness and relaxation activities such as **enjoying nature and hiking**. **Wildlife watching** is also exceedingly popular in the site. **Birding** is more prominent than in other areas (15% of visitors). In addition, **berry picking**, **kayaking**, **and swimming** are other important activities.

**Ruunaa** 2017 visitor survey states the main activities in the site as **hiking on the boardwalk**, **enjoying nature and landscapes**, **and fishing**. Over 35 % of visitors consider fishing the most important activity during their visit. During their stay, **visitors hike an average 10 kilometres**, cycle 30 km, kayak 20 km, or canoe 10 km. Ruunaa's specialty is rafting, which is an extremely popular experience in the Hiking Area (18% of visitors)<sup>52</sup>. Therefore, it can be concluded that the site is favored by both visitors seeking adventure, and those seeking slowness and relaxation.

#### 5.2.4. Activity participation by BR visitors

In **Koli National Park**, about half of the visitors are day visitors most of which go to the peak of **Ukko Koli to view the scenery**. Day visitors stay an average of four hours, while overnight stay in the National Park is an average 2–3 days. Most of the park guests stay either at a **hotel or in their own accommodation (tent, etc.)**. Those with accommodations closer to the park seem to stay for an average of 6 days, while those in their own cottages stay the longest in the area. It is also known that about **6,600 hikers opt for the Herajärvi trail every year**.

In **Petkeljärvi's** 56% of visitors visit the park daily. 60% of the visitors visit the Petkeljärvi hiking centre, and just **over half hike the Kuikan kierros trail**. Day visitors stay for an average of four hours, while overnight stays in the National Park is about two days. In the National Park, majority visitors stay **overnight in a motorhome or caravan**, **the Petkeljärvi centre or in their own accommodation (tent or shed)**. Those residing close to the park stay in the region an average 3.2 days, while those in their own cottages stay longest in the area.

In **Patvinsuo**, 42% visit the area daily and majority visit the **Suomu nature centre** (63%), the **shores of Lake Suomujärvi (62%) and Kurkilahti (46%).** Day visitors stay for an average of six hours, while overnight stays in the National Park average 2–3 days. The most common mode of stay in the National Park is **by own accommodation** (48% of visitors), in a tent or shed. Those with accommodation close to the park stay an average of 5.1 days in the area and those in their own cottage stay longest in the area.

37% of all visitors to **Ruunaa** visit daily and the majority (77%) visit **Neitikoski**. Day visitors stay average four hours, while overnight stays (63%) is mainly at the **camping area** for 2–3 days. The most favoured overnight in the camping area is at a **rental cottage (45% of respondents)**. Visitors with accommodation closer to the park stay in the area an average of four days, while those in their own cottage stay the longest.

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<sup>&</sup>lt;sup>51</sup> Lampinen 2016.

<sup>&</sup>lt;sup>52</sup> Paulus 2019.

TABLE 9. Average nights.

Length of overnights at accommodation (average overnights)	KoNP (6,1 nights)	RuHA (3,8 nights)	PaNP (5,1 nights)	PeNP (3,2 nights)	Average
Own cottage	8,7 nights	9,7 nights	11,7 nights	9,7 nights	10 nights
Rental cottage	4,3 nights	2,5 nights	3,4 nights	2,4 nights	6,3 nights
Own (tent, lean-to etc.)	3,3 nights	1,5 nights	3,4 nights	3,0 nights	2,8 nights
Hotel	1,8 nights	5 nights	3 nights	1,3 nights	2,8 nights
Caravan or mobile home	1,4 nights	3,1 nights	2.1 nights	1,7 nights	2 nights

### 5.2.5. Frequency of participation by BR visitors

All attraction sites across the Biosphere Reserve are mainly visited in the summer periods except for Koli which has a more balanced percentage of visitors both during summer and winter. Day visitors spend an **average of 5 hours** within the Biosphere Reserve during summer, while overnight visitors stay an average 3 days both during winter, and summer. In winter, day visitors spend on average 1 hour more than in summertime.

TABLE 10. Average stay in each attraction site

National Park and Hiking Area (Share and average stay)	KoNP		RuHA		PaNP		PeNP	
Winter (Day- overnights respectively)	56% (3,8 h)	44% (3,1 nights)	-	-	-	_	-	-
Summer (Day and overnights respectively)	55% (4,4 h)	45% (2,6 nights)	37 % (4,1 h)	63% (2,9 nights)	42% (6,2 h)	58 % (2,5 nights)	56% (4,3 h)	44% (2,2 nights)

**Repeat visits are common across all environments,** even though the Hiking Area is most favored (Ruunaa; 72% repeat visits). For National Parks, **Petkeljärvi** was the sole or most important destination of the trip to 14% of the visitors, **Patvinsuo** to 63% of the visitors, **Koli** to 57% of the visitors, while **Ruunaa** Hiking Area is the sole or most important destination of the trip to 66% of the visitors.

TABLE 11. Repeat visits.

	KoNP		RuHA		PaNP		PeNP	
Visited before - First visit (respectively)	56%	44%	72 %	28 %	52 %	48 %	43 %	57 %

It can hence be concluded that Biosphere Reserve is favored mainly as a summer destination with more that half repeat visits in three sites.

### 5.2.6. Perceived product benefit

Perceived benefit gives information on what different segments hope to benefit from by visiting a protected area<sup>53</sup>. One segment might expect to benefit from a challenging environment (e.g. through river floating or mountain climbing), while others might expect to learn about nature. Some might expect silence or wellness, some spend time socialising with friends or family, while others might simply expect to enjoy natural beauty. Segments can be identified by the product characteristics they prefer. The information can help map visitors' potential attraction sites, uses and choices of environments.

From researches by Metsähallitus on tourism in nature value areas, National Park and Hiking Area visitors seek mainly enjoyment of nature, exploring the landscapes, and relaxation. Silence and clean nature are also strong determinants of the choice of leisure environments.

Purpose of visit/ key attraction (scale 1–5, whereby 5 is highest)	KoNP	RuHA	PaNP	PeNP	Average
Landscapes	4,86	4,68	4,7	4,81	4,76
Enjoying time in nature	4,77	4,71	4,8	4,82	4,77
Relaxation	4,47	4,58	4,5	4,54	4,5
Time with travel companions	4,39	4,33	4,12	4,15	4,24
Wellness	4,26	4,3	4,5	4,37	4,35
Away from noise and pollution	4,21	4,38	4,63	4,4	4,40
Experiencing the area	3,91	3,83	3,87	4,06	3,92

TABLE 12. Perceived product benefit.

In **Petkeljärvi**, the visitors mainly travel in groups of 2–5 (79%) and with families (66%) or friends (17%). In **Patvinsuo**, the larger proportion of visitors (62%) arrive in groups of 2–5 people and travel with their own family (41%) or friends (33%). In **Ruunaa**, the larger proportion of visitors (80%) arrive in groups of 2–5 people and travel with their own family (68%) or friends (21%).

Visitor types		KoNP	RuHA	PaNP	PeNP
Group size	2-5	81%	80 %	62 %	79 %
	Over 6	15%	12 %	28 %	10 %
	Travelling alone	4%	7 %	9 %	11 %
Segment type	Family	69%	68 %	41 %	66 %
	Friends	17%	21 %	33 %	17 %
	Students	5%	1%	6 %	-
	with relatives	4%	5 %	4 %	8 %
	Work colleagues	1%	1%	3 %	2 %
	Club, association, etc.	-	-	10 %	3 %
	Other	1%	4 %	3 %	3 %

TABLE 13. Group size and segment of NKBR visitors.

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<sup>53</sup> Eagles et. al 2002.

Therefore, it can be concluded that the perceived benefits across all environments are mainly viewing of landscapes, enjoying time in nature, and relaxing. The main characteristic seems to be socializing with family or friends. No data exist for intentions to learn. However, this can be analysed in general by looking into geographical characteristics and socio-economic concerns of visitors i.e. consumption classifications by country of origin which can help identify if visitor type is a nature tourist, or dedicated ecotourist. Experiencing the area can also be somewhat related to intention to learn, hence could be made clearer in future.

# 5.3. ADVANCE IN COMMUNICATION AND SOCIAL MEDIA USE

Advance communication and social media use can lead to increased access to information of sites across protect areas which can in turn complicate management of environments. It is so that over 60% of tourists visiting NK find information from internet as tourists follow mainly social media and consider past tourists' experiences during planning of travel<sup>54</sup>. Therefore, social media depiction of specific sites as must visit can create pressures for protected area management.

For example, the Ukko Koli hill located inside Koli National Park has been rated second under most "instagrammable" places in Finland<sup>55</sup>. Metsähalltus surveys have confirmed that majority visitors in **Koli National Park** (over 50 percent) visit the peak of **Ukko Koli to view the scenery**. Chapter 5.2. (segmentation) gives an overview of various segments and their origins, and characteristics (e.g. activity participation, and favored environments). These can be used in bridging gaps in management by drafting adaptive methods for handling e.g. potentially abrupt influx of visitors, and in directing visitors to other similar sites of biosphere that are not potentially known/ popular, but that could help limit pressure to vulnerable sites.

#### 5.4. SOCIO-ENVIRONMENTAL CONCERNS AND PERSONAL SAFETY

The visitors' places of origin (cities for domestic segment, and countries for international segment) that favor Biosphere Reserve environments are known to area management as these data exists (see appendix 1). Very few studies have investigated the locations that people visit within Biosphere Reserve protected areas (i.e. all zones) and/or the resources they affect and used the results in the actual management policy of protected areas<sup>56</sup>.

For example, the largest group of visitors to NKBR are already known as domestic visitors accounting approximately 85 percent of all visits, while residents and international visitors account between 9 and 11 percent, respectively. The data can be analysed against already known visitor consumption classifications by country of origin (e.g. ecotourists, nature tourists) which could help strategize plans, marketing, and site communication.

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<sup>&</sup>lt;sup>54</sup> JOSEK 2015., Silvennoinen 2016.

<sup>55</sup> Visit Finland 2020.

<sup>56</sup> Chun et. al 2020.
Ecotourists or ecological tourists fall into three main categories; nature tourists (also termed "users"), "soft" ecotourists ("eco-aware") and dedicated ecotourists ("special ecotourists), with willingness to act sustainably highest among dedicated ecotourists<sup>57</sup>. Nature seeking Atlantic Europeans (Great Britain, Ireland, Iceland, Belgium, Netherlands, Portugal, Spain, France, Scandinavia and Germany) have through various studies, proven very keen on sustainability considerations when travelling<sup>58</sup>. Germans (key visitor segment for North Karelia) are for example considered more spread over the area and appreciate possibilities to enjoy a shared solitude, but privacy and relative secure environment throughout the park's zones during their visit<sup>59</sup>.

SHAPE NPA carried out research on land-use and visitor values on general state of environments of the Biosphere Reserve. The respondents were asked important attributes considered by them prior to deciding travel destination (figure 12). Personal safety and security rated fifth among aspects of importance<sup>60</sup>. Environmental concerns were also important to respondents. Respondents were additionally asked how the very attributes they seek were met in North Karelia. Personal safety and environmental concerns rated quite high<sup>61</sup>.



FIGURE 12. Important attributes when choosing a tourism destination (n=663; SHAPE NPA).

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<sup>57</sup> Silvennoinen 2016.

58 Tyrväinen et al 2014, p. 12., Silvennoinen 2016.

<sup>59</sup> Garms et. al 2017.

<sup>60</sup> SHAPE NPA 2019.

61 Ibid.

Despite the good reviews, visitors mentioned need for updating outdated infosigns. Frequent clean-up (mainly in peak period) was also mentioned. The key issues regarding infrastructure were mainly in connection to Koli NP, with two main ones as information signs "info-signs" and maintenance of the stop-over areas (meaning rest places within the National Parks). Signs in some areas were considered in bad condition, while current maps as outdated. Camping area in Koli was mentioned as not aesthetically attractive, hence needing improvement<sup>62</sup>.

On the other hand, Metsähallitus nature services that takes care of management and support infrastructures within parks and Hiking Area relies mainly on government funding as the largest source of funding for nature services. Therefore, recent funding reductions for the parks may have impacted the quality and state of infrastructure. Figure 13 shows the amounts of funding for National Park services by the Ministry of the Environment. The funding is decided by Parliament.



FIGURE 13. Metsähallitus funding by the Ministry of the Environment (Metsähallitus 2019c).

## 5.5. IMPORTANCE OF SERVICE QUALITY

Tourists increasingly demand high quality recreational opportunities and services that support them. Those who receive quality service during their normal working week are said to expect the same or more from their leisure providers<sup>63</sup>. They for example expect guides to be knowledgeable and good communicators, and want their hosts to make them feel welcome, comfortable, and part of the communities they visit<sup>64</sup>. Increase in protection area visits also reflects on the greater demand for specialised recreation and accommodation, all with a focus on quality<sup>65</sup>.

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<sup>62</sup>SHAPE NPA 2019.
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<sup>63</sup> Eagles et. al 2002.
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<sup>64</sup> Ibid.

<sup>&</sup>lt;sup>65</sup>Siikamäki et.al 2015.

As part of the assessment of the local economic impact of recreational use of Metsähallitus' conservation and camping areas, the amount of money spent by visitors during their visit is also mapped. The overall local economic impacts of nature tourism sites across the Biosphere Reserve vary greatly according to the number of visits66. Another influential factor is the service provisions and structures in the area. Income to local economy has been proved higher in sites where visitors stay longer and in areas with wider range of tourism services. Thus, the overall impact on the local economy is mainly influenced by the area's service structures and range of services, as well as the visitor profiles to the attraction sites. The most significant nature tourism sites of the Biosphere Reserve (Koli, Ruunaa, Petkeljärvi and Patvinsuo) have been assessed by the total income and employment effects of visitors' spending, that amounted to EUR 25.5 million and 204 person-years in 2019.

The richness of the Biosphere Reserve's network of National Parks and Hiking Areas is the diversity and uniqueness of each attraction site. The average spending by visitors in Koli National Park is the highest across all sites. The average spending of all visitors is **100€/visit**, while in the **Ruunaa Hiking Area**, **Petkeljärvi National Park**, **and in Patvinsuo National Park, the distribution is 66€, 62€ and 26€/visit respectively**. In each attraction site, the largest share of local revenue per visit came from accommodation, followed by cafe and restaurant purchases. The visitors' spending in Patvinsuo is significantly lower than in Koli, possibly because common accommodation choices for visitors at Patvinsuo (consisting of 48% of overnight park visitors) is by own accommodation, i.e. intent or shed contrary to hotel accommodation choice in Koli National Park, where 33% of the park's visitors spend overnight.

In all National Parks of the Biosphere Reserve and in the Ruunaa Hiking Area, the average spending by domestic visitors is higher than that of international visitors. In Koli, the overall spending by all visitor groups (domestic tourists, residents, and international tourists) is higher than in other parks and Hiking Areas. Domestic visitors spend significantly more than any other visitor groups in Petkeljärvi. In Ruunaa, Patvinsuo and Petkeljärvi, the average spending of international visitors is more than residents, contrary to Koli where residents average spending is more than that of international visitors. It ought to be noted that no entrance fees are charged to visitors for visits to National Park, Hiking Area, nor other zones of the Biosphere Reserve.

## 5.6. CONCLUSIONS ON GAPS IN MANAGEMENT Planning for NKBR

The trends and policies that affect management are somewhat known for North Karelia Biosphere Reserve. However, destination specific rules and regulations are rather fragmented, mainly when considering visitor pressures where numbers could rise by millions come 2050. Public access rights grants rights to all visitors to use environments irrespective of ownership. In addition, no entrance fees are charged across Biosphere Reserve attraction sites hence reliability of funding to carry out needed actions.

Environmental impacts do not respect Biosphere Reserve zones. Therefore, impacts by visitors on other zones can concurrently move through natural causes into protected areas of the Biosphere Reserve. Under circumstances of abrupt visitor flow,

or large influx of visitors favoring environments as is at present, a more diversified management approach for pressures on environments both inside the park, and most importantly on surrounding environments outside but close to the National Parks and Hiking Areas of the Biosphere Reserve will be needed.

Visitors to Koli mainly hike or ski while in the park<sup>66</sup>. Presently, during peak season (summer), domestic, residents and international visitors to Koli National Park account 77%, 9% and 14% respectively<sup>67</sup>. Under scenario that the target of over 2million visitors a year is reached by 2050, approximately 280,000 international visitors, and 1.5 million domestic arrivals are to be expected in Koli per year. In addition, the peak seasons attract 70% of visitors. If the visitors continue to favor same activities in the park as is presently, Koli would expect to get at least 20,000 visitors per day during peak month (July). Reaching the park is stated as possible by car or taxi as other modes are problematic. Improving accessibility to the park is therefore mentioned in the tourism strategy. Presently, approximately 80% of visitors arrive in a group of 2–5, 70% of these arriving as families. Therefore, if similar trend were to continue, and that for example 50% visitors arrive by own cars during peak season (e.g. in a group of 4 per car), at least 250 cars are expected to arrive to Koli each day during peak month of July. In 2019, 57% of visitors to Koli considered the park as the only or most important destination, while over 50% were return visitors. Visitors spent an average 4,4h in the park during visit. Little over half of the visitors go to peak of Koli and half visit the visitor centre.

Ruunaa is also a key Hiking Area of the Biosphere Reserve and a summer destination. It attracts approximately 80,000 visits every summer, 30% of which are international visitors. Ruunaa also has a development plan that aims that outbound visitors consist 30% by 2030<sup>68</sup>. This would mean about 54,000 international visitors to the target every summer. However, unlike Koli (Hiking, and skiing), Ruunaa visitors seem to favour multiple activities exists (i.e. hiking, cycling, kayaking, canoeing, and fishing) which could keep pressures in more manageable situation if pressures will spread, not concentrated to specific areas across the target. However, since it focuses also on increasing the outbound visitors, the pressures will depend on the characteristics of the visitors (e.g. seeking hard adventure, level of knowledge and interest in conservation, visitor guidance, etc), and how management strategies and policies will be designed to minimize negative impacts of potential pressures (such as littering, keeping to designated routes, awareness etc) and maximize the positive impacts, in addition to protected area managers understanding of various human pressures.

The visitor segmentation already defines in detail the characteristics of Biosphere Reserve visitors. Data exists for all protected area environments (i.e. National Parks and Hiking Area) thanks to Metsähallitus 5–10-year visitor surveys and visitor count. Data also exists on origins of both domestic and international visitors and potential hotspots (e.g. favored Kuikan kierros trail in Petkeljärvi NP, and peak of Ukko Koli in Koli NP). Outside the protected core areas in other Biosphere Reserve zones (i.e. where visitors can exercise public access rights), no similar data exists (see table 15).

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67 Ibid.

<sup>&</sup>lt;sup>66</sup> Naumanen 2020.

<sup>68</sup> Naumanen 2020.

TABLE 14. Scenerio example of key visitor sites across NKBR by 2050 (\*need be noted that visitors may visit more than one site). The current threats to biodiversity and tourism are based on specific protected area threats per the Metsähallitus use and management plans.

Protected area (average annual visits)	rotected area Examples of favoured sites across protected areas		2050 scenerio (the plan is realized)	
Koli NP (200 000)	<b>Plan:</b> Increase visitors a tenfold by 2050	Approx. 200,000	2,000,000	
-All-year destination -80km of trails -Key attraction: summit of Ukko-Koli -Biodiversity threats: Traditional biotopes, changes in specie habitats	Visits in peak month July	Approx. 60,000	Approx. 600,000	
	Current share international visitors (10%)	Approx. 20,000	Approx. 200,000	
	Ukko Koli scenery; currently about 50 percent of visitors also visit the scenery	Approx. 100,000	Approx. 1,000,000	
	Koli nature center Ukko	Approx. 100,000	Approx. 1,000,000	
	Herajärvi trail use: 6,600 visitors/year	Approx. 6,600	Approx. 66,000	
Ruunaa HA (80 000) -Summer destination -30km marked trails -Biodiversity threats: Natura 2000 sites, Endangered species	<b>Plan:</b> Increase visitor numbers to 180,000/ year from average 80,000. Runnaa is mainly a summer destination	Approx. 80,000	Approx. 180,000	
	<b>Plan:</b> 30% are outbound visitors (current: consist 7% share)	Approx. 6,000	54,000 visitors	
	Key activity: Fishing favored by 35% *other activities→ canoeing, hiking	Approx. 28,000 (fishing)	63,000 visitors (fishing)	
Patvinsuo (17 000) -Summer destination	Plan: None	Approx. 16600	*could be influenced by trends e.g. increase	
-80km of trails -Self-guided hiking	Lake Suomujärvi (62%)	Approx. 11000	*influenced by trends	
-Biodiversity threats: Habitats and nesting (Important Bird Areas; IBAs), Quality of Waters	Bird watching (15%) *Other activities	Approx. 2500	*could be influenced by trends e.g. increase	
Petkeljärvi (20 000) Summer destination -Suited for day hikes -Biodiversity threats: Natura 2000 sites, Old- growth forests, flora of the dry heath soil	Plan: None	Approx. 20,000	*could be influenced by trends e.g. increase	
	56% visit the park daily	Approx. 11,000	*could be influenced by trends e.g. increase	
	60% visit Petkeljärvi hiking centre	Approx. 12,000	*could be influenced by trends e.g. increase	
sensurity to transpung	Kuikan kierros trail: Over 50% hike this trail	Approx.10,000	*could be influenced by trends e.g. increase	

The areas outside Metsähallitus management, and areas with fragmented management responsibilities (public access rights Vs landowner management responsibility) are potential pressure sources that can also create conflicts if not mitigated earlier in the planning process. Success will depend on timing, participation, and the ability to secure tools (e.g. funding and personnel) to deal with the proposed growth and potential pressures (also for other biosphere zones outside NPs and Hiking Area). Other tools are laws and regulations, awareness, networking, and co-governance.

Methods	Variables (K=Known, U=Unknown)	Ко	NP	Ru	HA	Pa	NP	PeN	1P	Oth BR an zon	er eas/ es
		K	U	K	U	K	U	K	U	K	U
Geographic characteristics	Origins of visitors	*		*		*		*			*
	Distance from sites	*		*		*		*			*
	Modes of transportation	*		*		*		*			*
Socio-	Age	*		*		*		*			*
demographic characteristics	Gender	*		*		*		*			*
	Occupation		*		*				*		*
	Income level		*		*		*		*		*
	Level of education	*		*		*		*			*
Psychographic segmentation	Aim of visit (e.g. seeking adventure, slow adventure, slowness, or relaxation)	*		*		*		*			*
Activity participation	Activities/interests (e.g. camping, wildlife watching, hiking, Kayaking/ canoeing)	*		*		*		*			*
Frequency of participation	Frequent travellers, repeat visits, first-time visitors	*		*		*		*			*
Perceived product benefit	Socialize (e.g. spending time with family/friends), silence, learning	*		*		*		*			*

TABLE 15. Gaps in visitor segmentation for NKBR.

The already existing information can be utilized in predicting and drafting possible future scenarios e.g. potential pressure sources, and potential hot spots for biosphere protected areas (i.e. National Parks and Hiking Area). Looking at various research findings could help the region plan for potential pressure scenarios earlier in advance (e.g. what resources might be needed, and how they could be sourced when needed). For example, resident visitors can be aware of how to act within the environments. On the other hand, domestic and international visitors might not, hence ways to guide actions to limit pressures might be necessary (e.g. congestion, trampling, biodiversity loss, and conflicts with communities). Detailed data already exists on annual origin of North Karelia visitors. These can be for example be analysed against already known visitor consumption classifications by country of origin (e.g. ecotourists, nature tourists) and new emerging trends (megatrends) which could help strategize plans, marketing, and site communication.



FIGURE 14. Example of Visitor and resident values and uses of natural environments across NKBR (SHAPE NPA 2019).

## 6. MANAGING VISITOR PRESSURES IN PROTECTED AREAS

Balancing tourism development and nature conservation (i.e. visitor-use limits) within protected areas is still a challenge for many tourism destinations. This is evident from research, forum discussions, and events (e.g. media) that have raised the need for tackling existing and potential visitor pressures in destinations (see chapter; introduction). For example, Iceland and Norway entail iconic nature attractions like in the case of Koli National Park, meaning visitors are in geographically concentrated areas. The two countries have in the last few years seen an unprecedented influx of tourists, something neither the government nor tourism industry had prepared for<sup>69</sup>.

In the previous chapter, we looked at trends and policies affecting the management planning of protected area tourism, and how these are considered in management of North Karelia Biosphere Reserve environments. North Karelia has had a more gradual increase in visitor numbers that has, despite decreasing funding, been met by gradual development of infrastructures. Still, findings show that potential impacts need be assessed when considering the current nature tourism plan that aims to increase visitors to millions by 2050. Mainly due to (a) the current complexity of applying movement restrictions to the various zones of the Biosphere Reserve due to public access rights, and (b) all visitor attraction sites are withing the Biosphere Reserve, and are in addition mainly summer destinations (except for Koli NP; all year destination with approximately 60% visits during summer). Moreover, statistics show that over 70 percent of visitors that visit North Karelia province also visit the Biosphere Reserve protected areas during their stay.

Management planning involves selecting a desirable scenario from a range of plausible alternatives and implementing strategies and actions that will help achieve the desired outcome<sup>70</sup>. To develop actions that are more efficient and effective and ensure that strategies and actions can be adapted to changing conditions, the understanding of destination specific characteristics (i.e. policies and laws), visitor segmentation and potential socio-economic impacts is crucial. IUCN has categorized limits of various types of protect area environments for touristic uses.

In other terms, this chapter tries to answer to the question: "How can North Karelia Biosphere Reserve be managed such that the quality of environments is not degraded to an unacceptable degree?". In the context of tourism, the term 'carrying capacity' also termed "visitor-use limits" refers to the maximum number of people that may visit a tourist destination (in this paper, a protected area) at the same time, without causing (i) destruction of the physical, economic and sociocultural environment, and (ii) an unacceptable decrease in the quality of visitors' satisfaction<sup>71</sup>.

There exists multiple analysis and case study research and management options offered depending on location and structure of protected area. These include both precautionary methods (potential uses), and real-time methods (real-time use). Some are numerical (qualitative), while others are descriptive (qualitative). Examples of

<sup>• • • • • • • • • • • • •</sup> 

<sup>69</sup> Øian et. al 2018.

<sup>70</sup> Reed, M., Price, M 2020.

<sup>&</sup>lt;sup>71</sup> Leung at. al 2018.

quantitative methods include direct observation, video observation, counting devices and registration books<sup>72</sup>. Qualitative methods include understanding of visitors' motivations and experiences by mapping value areas e.g. through Public Participation. Some, such as Geographic Information Systems (PPGIS) can be both qualitative and quantitative<sup>73</sup>. Issues such as climate change and land-use conflicts have seen a rise in methods for precautionary mapping of potential uses such as potential touristic use (PTU) and degradation risks (DR). In some instances, soft solutions (e.g. as strategic targeting of information, and greening messages), or a mix of various methods are proposed.

In this chapter, we look at sustainable management practices and tools that could be adapted or applicable to managing potential visitor pressures on North Karelia Biosphere Reserve's natural environments. In other words, methods or instruments that could potentially bridge existing gaps to handling visitor pressures across Biosphere Reserve environments. This is done by benchmarking sustainable environmental management practices and measures. The examples are offered in line with gaps that were identified in previous chapter (see chapter 5).

## 6.1. REAL-TIME MONITORING TOOLS

The challenge to harmonize nature-based tourism with species conservation is important both from an economic, cultural, and ecological perspective. One approach for understanding this interaction is to compare the overlap between tourism activities and species' space use or biodiversity hotspots, with the purpose to identify areas, periods, and conditions in which tourism exerts the highest negative impact<sup>74</sup>. Very few studies have investigated the locations that people visit within each protected area and/or the resources they affect and used the results in the actual management policy of protected areas<sup>75</sup>.

The managers of protected areas have traditionally gained the information needed to manage own parks by using visitor counting data and visitor surveys<sup>76</sup>. However, visitor-based analysis compiled at entry points makes it difficult to understand the spatial distribution of visitors use of environments and what resources they affect. Site-specific surveys at protected area entrances and surveys applying Public Participation Geographic Information Systems (PPGISs) have been used by some who have attempted to go further and identify visitors' spatial visitation patterns<sup>77</sup>. However, these tools have proven to have limitations (e.g. expensive) and that they provide limited and temporary information about the tourism pressures in protected areas<sup>78</sup>. In some cases, users (i.e. park management) have considered their current

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<sup>&</sup>lt;sup>72</sup>Leung et. al 2018.

<sup>&</sup>lt;sup>73</sup> Pietilä M 2018.

<sup>&</sup>lt;sup>74</sup>Gundersen et. al 2019.

<sup>75</sup> Chun et. al 2020.

<sup>&</sup>lt;sup>76</sup>Heikinheimo et al., 2017.

<sup>&</sup>lt;sup>77</sup> Brown & Weber 2011, 2012., Whitehead et al., 2014.

<sup>&</sup>lt;sup>78</sup> Hausmann et al., 2019 & Wood et al., 2013, in Chun et. al 2020.

structures impractical and/or needing improvements (e.g. mobile and ability to mapping of experiences on-spot)<sup>79</sup>.

Real-time data on visitors' motivations, behavior, and preferences is still the best way of getting first-hand information which can help managers evaluate policies, plans and programs in addition to identifying the most appropriate interventions for different scenarios<sup>80</sup>. This can be done on-site using various methods chosen according to resources (e.g. time and costs) and intent (i.e. the issue in question). Table 16 below gives a synthesis of common methods used for analysing visitor pressures and impact sources.

Pressures	Assessment methods	Usefulness of method	Study/Authors	
Congestion, pollution	-Monitoring recreational use; influx and seasonality	Characterizing recreation related impacts	Arnberger & Hinterberger 2003., Pietilä M 2018., Barros et.al 2019., Erkkonen & Sievänen 2002., Gutiérrez & Martínez 2012., Klanjšček et. al 2018.	
	<ul> <li>Use of data/geodata on the temporal distribution of visitors (QT)</li> <li>-GPS units and visitor questionnaires</li> </ul>	Mapping site degradation risk Controlling visitor traffic across natural environments Visitor guidance (visitor traffic peaks, movement behavior and preferences, and guide visitor distribution)		
	-Standardisation of visitor surveys (QT)	Improving visitor experience/ increasing supply opportunities		
	Limit of Acceptable Disturbance (LAD)	Mapping maximum acceptable level of disturbance		
Identifying trampling, erosion, degradation	-DPSIR analysis	Identifying key places used by visitors Evaluating trails and key nature attraction sites most prone to trampling/erosion	Arnberger & Hinterberger 2003., Barros et.al 2019	
	-Use of data on the temporal distribution of visitors	Identifying key places used by visitors Mapping of traces of use		
	-Financial impact monitoring	Identify impact causing behaviour		
	-Route analysis by the application of GIS tools	Analysing use patterns; show potential trail deterioration damage and pollution sources (e.g. garbage, erosion)		
Locals-visitor conflict areas	-Mapping locations of potential conflicts using PPGIS) -Combination of monitoring and survey data -On-site interviews with questionnaires + on-site monitoring, with additional urban planning analyses	Identifying potential touristic uses Targeting information/ strategic awareness for visitors Facilitating communication between visitors and managers concerning site conditions/ conservation values Preparing future management plans for the protected area (local Vs visitors uses and guiding actions)	Brilha 2014., Arnberger & Hinterberger 2003., Pietilä M 2018., Nagy K in Arnberger et. al 2002., Hall and McArthur 1998.	
Analysing the	-Visitors motivations	Characterizing influx and seasonality	Muhar et.al 2002., Aoki et.al 2002., Arnberger & Hinterberger 2003., Guo et. al 2019.	
visitor load	-Camera-captured monitoring -Entrance counts	Identify best ecological communication places and methods Managing use levels/ Identifying pressure areas (e.g. predict daily average and maximum use level at the hotspots)		

TABLE 16. Management tools for managing visitor pressures in protected areas

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80 Sebestyén V. et al. 2019.

<sup>&</sup>lt;sup>79</sup> Pietilä M., Fagerholm N 2018.

Managing degradation	-Limits of Acceptable Change analysis	Following recreation activity and visitor behavior Managing use levels/ Identifying pressure areas (e.g. predict daily average and maximum use level at the hotspots) Zoning /reducing demand for problematic visitor uses	Lucas, 1982; Lucas, 1983; Monz, et al., 2000; Manning, 2011.
	-Imposing rules and regulations	Controlling use	
Monitoring visitor impacts	VIM-Visitor impact management, VERP- Visitor experience and resource protection, Tourism Opportunity Spectrum (TOS), Visitor Activities Management Planning (VAMP), Visitor Impact Monitoring Process (VIMP).	Defining conservation and management goals for the area Continuous monitoring of activities Deciding on acceptable levels impacts in the different management zones	Gundersen et. al 2015., Pietilä & Kangas, 2015.
	Recreation Opportunity Spectrum (ROS), Limits of Acceptable Change (LAC),	Important where zoning and spatial regulations, or restrictions are difficult to apply e.g. areas of access rights Find a balance between landscape use and conservation by directing people to areas with low conflict potential for nature conservation	

## Potentially applicable cases to NKBR

### I Identifying impacts

#### Identifying potential impact sources by GPS surveys; Průhonice Park and World Heritage Site

As part of the Historic Centre of Prague, Průhonice Park and World Heritage Site is one of the most intensively used parks in Czech Republic. Its area of approximately 250 ha, consists of 30 km of trails, and is located 15 km southeast of Prague city centre. The park receives an average of 155,000 visitors annually with the most intensive visitation occurring in April and May. Due to the park's high popularity, some of its areas are crowded at certain times. To address crowding impact concerns, Průhonice Park management established a research programme to monitor, analyse and understand visitor uses and behaviour patterns. According to Monteiro et. al 2014, the research was based on a hybrid approach consisting of two complementary parts: questionnaires and GPS surveys, divided into three main stages: data collection, survey analysis and data synthesis.

During their research, each respondent was briefed and then given a GPS unit and asked to carry it during the remainder of the visit and return the unit upon completion. The GPS dataset was linked with equivalent questionnaires in strict association with visitor type, and information was generated regarding the most popular places, preferred itineraries, time spent at each site, and distance and speed of travelling. GPS data were downloaded for spatial and temporal analyses.



PHOTO 2. Průhonice Park and World Heritage Site Heritage Site (Wikimedia Commons).

Results were overlapped with a GIS data inventory of Průhonice Park's trail system including the different attractions and facilities. This allowed the production of more realistic scenarios regarding typical visitor movement patterns, preferences, and behaviours within the park<sup>81</sup>.

This method makes it possible to identify different park areas according to their susceptibility to being crowded and zones prone to potential ecological impacts from human activities. Visitor preferences and behaviours of North Karelia National Parks and Hiking Area visitors is already known. These could be compared and matched with the biophysical and cultural attributes of each park to reduce adverse impacts by target marketing, and sensitively promoting appropriate protected area attributes to the various visitor types.

#### Monitoring impacts

#### LAC analysis, Bob Marshall Wilderness Complex

The Bob Marshall Wilderness Complex in north central Montana managed under provisions of the 1964 Wilderness Act. It comprises 600,000 hectares of temperate forest, and attracts 25,000 visitors, primarily from June through November. June to September is dominated by backpacking and horse- supported backcountry trips. In the autumn, most use is for big game hunting. Limits of Acceptable Change (LAC analysis) was undertaken and focused effort on addressing how much change in wilderness, biophysical and social conditions is acceptable.

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<sup>81</sup> Monteiro et. al 2014.



PHOTO 3. Bob Marshall Wilderness Complex (Wikimedia Commons).

By designing an additional public participation process that incorporated the full range of values involved in the Wilderness area, participants developed a set of management actions that were effective in reducing and controlling human-induced impacts, and achieved the social and political acceptability necessary for implementation.

The plan has three broad characteristics: (I) It establishes four opportunity classes (zones) designed to protect the pristine character of the wilderness, yet realistically permits some trade-offs between recreation use and human-induced impacts, (II) It identifies indicator variables – things to monitor to ensure conditions remain acceptable and to use to establish the effectiveness of actions implemented to control or mitigate impacts. For each indicator, quantifiable standards exist, indicating what limit of change from the natural baseline is acceptable in each zone. (III) It indicates for each zone the management actions in order of their social acceptability. This gives the manager a choice of tool and determines what management action will be most acceptable in controlling impacts. Each zone is described by the biophysical, social and managerial setting conditions that are acceptable. Eagles et. al 2002 offers an example of monitoring impacts at the opportunity classes represent amounts of impact permitted on a continuum with Opportunity Class I being most pristine, while Opportunity Class 4 is least pristine<sup>82</sup>.

This procedure encourages the least intrusive management action first as zones form the framework for managing potential human-induced impacts. This can be useful in managing North Karelia Biosphere Reserve zones with fragmentation in land ownership, management, and public access rights.

<sup>82</sup> Eagles et. al 2002.



PHOTO 4. Montague Island Seal Colony (Wikimedia Commons).

## Financial impact monitoring, Montague Island Nature Reserve

Montague Island Nature Reserve, off south-eastern Australia, contains both natural ecosystems (penguins, seals, sea birds) and cultural features (European and aboriginal history) of national importance. From 1990 to the present the management agency, the New South Wales National Parks and Wildlife Service, developed a system of use capacity limits, community consultation and monitoring of impacts. Measurement of the economic impact of the tourism showed the value of financial impact monitoring. Carefully done regional economic impact study can determine expenditures impact by visitors to regional economy. The information can help the local community develop a better appreciation of the role of conservation and tourism in their area<sup>83</sup>.

### II. Regulating impacts

#### Regulation and zoning to prevent overuse and local-visitor conflicts, Grand Canyon National Park

Grand Canyon National Park in the USA is a UNESCO World Heritage Site. The Colorado River, the living heart of Grand Canyon, has been a vital source of water for Native American tribes for 12,000 years. According to Leung et. al, the river also became popular with boating, some of them requiring considerable expertise and experience to negotiate. To protect the river from over-use, conserve park resources and allow visitor experiences by enhancing river- running recreational activities, the park's current management plan did the following:

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 $<sup>^{\</sup>rm 83}\,Eagles$  et. al 2002., Reed, M., Price, M 2020.



PHOTO 5. Rafting in Grand Canyon (Wikimedia Commons).

(I) Permit requirement for non-commercial trips and limits to commercial trips, (II) Rules and regulations: commercial boat passengers must be accompanied by a National Park Service-approved guide on all trips, and visitors are not allowed to use some parts of the park during certain seasons to protect threatened plant specie, and (III) incorporating both spatial and temporal zoning: 'primitive', 'semi-primitive', and 'rural natural setting' designed to offer three different types of visitor experiences and limit motorized uses<sup>84</sup>. This method can regulate over-use of resources, while creating income to regional service providers (e.g. rafting and canoeing).

#### Regulatory analysis for degradation, protected areas in the USA

A study conducted in several protected areas in the USA examined three regulatory approaches addressing campfires: banning them, restricting them to certain sites, or leaving them unregulated<sup>85</sup>. Findings suggest that banning them does not substantially reduce their impacts, but that having no regulation results in excessive resource degradation. The study concluded that designating campfire sites, combined with banning the use of axes, hatchets, and saws, was the best way to control the impacts of campfires while preserving an option that is highly valued by visitors. To be effective, managers need to communicate the rules and regulations clearly so that visitors are aware of them, the reasoning behind them, and the sanctions associated with a failure to comply (e.g. fines, penalties)<sup>86</sup>.

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<sup>&</sup>lt;sup>84</sup>Reed, M; Price, M 2020.

<sup>85</sup> Leung et. al 2018.

<sup>&</sup>lt;sup>86</sup> Ibid.



PHOTO 6. Campfire (Sami Niemeläinen)

#### Reducing pressures in biosphere core and buffer zones, Phong Nha–Ke Bang National Park

Phong Nha–Ke Bang National Park is situated in the central Vietnamese province of Quang Binh. In 2003, the National Park was declared a UNESCO World Heritage Site for its geological and geomorphological values, particularly its unique limestone karst formations and cave system. The designation as a World Heritage Site helped promote tourism in the Quang Binh province.

However, as per Leung et. al 2018, a rapid tourism growth in the area increased pressures on the region's environments and on the communities living within the National Park's buffer zone, who also relied heavily on the local natural resources. In 2007, the Vietnamese government began implementing a collaborative development project with Germany's Federal Ministry for Economic Cooperation and Development. The project focused on the core area of the National Park and the buffer zone, which includes 13 communes and 157 villages. The project sought to create a management plan for the National Park to protect its biodiversity and ecosystems, limit impacts on local population through sustainable planning for the buffer zone by enhancing sustainable tourism consistent with park initial conservation objectives.

A participatory process with rights-holders and stakeholders led to the development of a Sustainable Tourism Development Plan 2010–2020, which has served as the major planning tool for local and provincial authorities. Significant collaboration efforts among government authorities, park managers and local communities is one of the key reasons that the plan succeeded<sup>87</sup>. North Karelia Biosphere Reserve already has a functional network of stakeholders represented in their steering committee and

<sup>87</sup>Leung at. al 2018.



PHOTO 7. Phong Nha-Ke Bang National Park (Wikimedia Commons).

working group (see figure 11). Metsähallitus that manages the National Parks and Hiking Area are also part of the committee and working group. The cooperation could be useful in limiting pressures or conflicts in instances of sudden visitor growth (e.g. residents Vs Tourists).

## **6.2. PRECAUTIONARY METHODS**

Social media platforms e.g. Facebook and Instagram are driving a new and more individualised tourist behaviour where information is shared, and destinations promoted sometimes beyond what park management can control<sup>88</sup>. Such platforms provide visitors with information and recommendations that are sometimes contrary to what certain National Park and Hiking Areas want to promote. In this respect, these uncontrollable platforms can quickly change the management of natural environments by promoting places in the park which in turn become hotspots. Some of these may not be suited for handling large visitor numbers. Iconic nature attractions such as national landscapes can also become geographically concentrated areas. Unprecedented influx of visitors can surpass protected area managers expectations<sup>89</sup>. Methods for precautionary mapping such as assessment of touristic use and degradation risks are important for projecting issues such as unexpected visitor influx, climate change and land-use conflicts.

<sup>88</sup>Nordic Council of Ministers 2019.

<sup>&</sup>lt;sup>89</sup>Øian et. al 2018.

## 6.2.1. Assessment for Potential Touristic Use (PTU)

Assessment of the potential touristic uses and of sites' degradation risk can help draft a resilient strategy for nature protected areas or sensitive site management<sup>90</sup>. Even though high tourism potential is important for protected areas, low degradation risk is inevitable and must be considered in management strategy. The success and long term economic, social and environmental sustainability of tourism in nature protected areas such as Biosphere Reserves and heritage sites are dependant on the continued good state of the nature and biodiversity as these are the key aspects that attract visitors to these sites.

A site has a high PTU when the touristic elements have a remarkable aesthetic relevance (reflected on state of environment) and its conservation values easily understood by visitors, as well as being associated with a low risk of degradation by tourism activity. Low degradation risk means control of site vulnerability as result of existence of good facilities and visiting conditions for touristic use of a sites e.g. limit of congestion.

Appendix 2 presents an adapted version of the quantitative assessment of potential touristic use (PTU) and assessment of degradation risk based on criteria analysis by Brilha in the review article "Inventory and Quantitative Assessment of Geosites and Geodiversity Sites: a Review"<sup>91</sup>. The table is created using synthesis of existing scientific articles that have assessed variables that impact visitor influx levels to protected areas. Among other, Metsähallitus management and use plans, Metsähallitus surveys and Statistic Finland data on North Karelia between 2009–2019, and European commission report on measuring carrying capacity<sup>92</sup>. In using this method, each criterion is scored 1 to 4 points (zero is also possible) with result of the weighted sum of the scores as the final evaluation of the touristic value. In assessing the potential for touristic use, 13 step criteria is used. These are:

- 1. *Scenery*: represents the beauty of the biodiversity element that might attract visitors, increasing the site's TV
- 2. *Safety*: if the visit can be made under low risk conditions for visitors, the site's TV increases
- 3. *Accessibility*: the easier and shorter the walk between the visitors' transportation (bus, car, etc.) and the site is, the higher the touristic value
- 4. *Logistics*: the inexistence of facilities for receiving tourists, such as information centres, accommodation, food and toilets, decreases the site's TV
- 5. *Proximity of recreational areas:* a touristic visit to a site may benefit from the existence of well-known tourist attractions in the surrounding area.
- 6. *Uniqueness*: concerns the distinctiveness and the rarity of the biodiversity elements that could stimulate a sense of satisfaction for the visitors
- 7. *Association with other values*: the diversity of natural or cultural elements associated with the site may increase the number of potential visitors and consequently the TV of the site

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<sup>&</sup>lt;sup>90</sup>Brilha 2014.

<sup>91</sup> Ibid.

<sup>&</sup>lt;sup>92</sup> Among other: Metsähallitus 2017., Joppa et. al 2009., European Commission 2009., Chung et. al 2018., Brilha 2014., Strickland-Munro et. al 2009., Stemberk et. al 2018., Aoki et.al 2002., Nerg et. al 2012., Nordic Council of Ministers 2018–2019.

- 8. *Observation conditions*: the better the observation of all the biodiversity elements of the site, the higher its TV
- 9. *Interpretative potential*: related to the capacity of a biodiversity conservation values easily understood by visitors, i.e. typical members of the general public
- 10. *Economic level*: the high level of income of people living near the site suggests a higher probability of it being visited
- 11. *Density of population*: the existence of towns/cities near the site as a potential source of visitors to the site increases its TV
- 12. *Vulnerability*: the existence of diversity elements that can be destroyed by visitors decreases the touristic value (TV) of the site.
- 13. *Use limitations*: the existence of obstacles that may be problematic for the development of touristic activities has an impact on the site's TV

#### 6.2.2. Assessment for Degradation Risk (DR)

Trampling is the first impact of degradation. It allows the ground vegetation and forest floor to compress and compact, reducing its component size, eventually resulting in exposure and hardening of soil mineral layers. The loss in turn exposes soil to heavier freezing, alters its physical properties and moisture conditions, thereby causing the ground cover to grow sparse and weaker, reducing forest productivity. Lacking the plant cover and the forest floor, the soil is susceptible to erosion by wind and water<sup>93</sup>. Assessing the site's value and its degradation risk (i.e. precautionary tool) helps draft better visitor management plan.

The numerical evaluation of site DR to complement the assessment of a site's value is of crucial importance for the preparation and implementation of a management plan, since the value of a site and its DR are essential for establishing priorities for a sites' action plan<sup>94</sup>. Fuertes-Gutiérrez and Fernández-Martínez (2012) present the DR as a combination of vulnerability, fragility, and other factors, such as accessibility, dimensions, proximity to human settlements, public influx, and present or potential threats. Fuertes-Gutiérrez and Fernández-Martínez additionally clarify the concept of vulnerability as 'risk of destruction induced by human activity", meaning sites are vulnerable as a result of intensive human activity or when their dimensions are so small that any slight disturbance by human activity can cause damage'<sup>95</sup>. The fragility of a site measures destination/ site's degradation risk i.e. the occurrence of either a rapid human scale damage or destruction, under present natural conditions without the intervention of man.

Both concepts are used with the same meaning in this paper. The proposal for the quantitative assessment of site DR (appendix 3) has been developed taking into consideration of key biodiversity sites and nature tourism values and the best practices published in recent years, including Nordic Council of Ministers (2019), Eagles et. al (2002). Reed and Price (2020). Naumanen (2020), Paulus (2019), Lampinen, (2016), Pääkkölä (2020), Cendrero (1996a; b), Brilha (2005), Carcavilla et al. (2007), Reynard et al. (2007), Neuvonen t. al (2010). Watson et al (2014). García-Cortés and Carcavilla

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<sup>93</sup> Jägerbrand & Alatalo 2015.

<sup>&</sup>lt;sup>94</sup>Brilha 2014.

<sup>95</sup> Fuertes-Gutiér-rez and Fernández-Martínez 2010, in Brilha 2014.

Urquí (2009), Lima et al. (2010), Pereira and Pereira (2010), Arnberger & Hinterberger 2003, Nerg et. al (2012), and Fassoulas et al. (2012).

The DR assessment, unlike PTU is based on five criteria:

- 1. *Deterioration of biodiversity elements*: reflects the possibility of loss of key attraction elements in the site as a consequence of (i) its fragility, namely its intrinsic characteristics (susceptibility to erosion, climate change impacts etc.) and (ii) its vulnerability to visitor actions (e.g. trampling, littering)
- 2. *Proximity to areas/activities with potential to cause degradation*: intensive forestry, mining, industrial facilities, roads, urban areas, etc.
- 3. *Legal protection*: related to the location of the site in an area with any type of legal protection (direct or indirect). Access control refers to the existence of obstacles such as restrictions by the owner, fences, need to pay entrance fees
- 4. *Accessibility*: reflects the conditions of access to the site for the public. A site with easy access is more likely to be damaged by visitors' misuse than one with difficult access
- 5. *Population density:* reveals the number of persons that live near the site and that can cause potential deterioration to the site due to inappropriate use (littering, pollution etc).

## *II Potentially applicable cases to NKBR*

*Use of physical infrastructure to protect sensitive habitats, Kakum National Park* Indirect approaches and site-specific management measures such as use of strategically thought out physical infrastructure for visitor guidance e.g. visitor centers, viewpoints, information boards, marked trails, campsites and bridges tend to direct visitors in particular areas, while protecting valuable natural resources at the same time.



PHOTO 8. Kakum National Park (Wikimedia Commons).

Kakum National Park in Ghana provides a habitat for globally endangered Forest Elephants, Bongo, Yellow-backed Duiker and Diana Monkey, an estimated 550 butterfly species, 250 species of birds, and 100 mammal, reptile and amphibian species. This area is part of the Guinean Forest Region of West Africa, a globally important area of biodiversity. To provide viewing of the wildlife while at the same time protecting potential visitor pressures, an aerial walkway was constructed, the first of its type in Africa. The walkway is 333m in length and is suspended approximately 27m off the ground by eight huge emergent trees. The canopy walkway offers students, tourists and researchers access to the rainforest canopy while at the same time protecting the important habitats<sup>96</sup>.

*Strategic location of campsites and stop-over areas, Pallas-Yllästunturi National Park* A study investigated the impacts of tourism on vegetation and soil on campsites in Pallas-Yllästunturi National Park, Northern Finland. Altogether, 19 campsites were surveyed to estimate the current condition of campsites and to specify factors affecting the amount of disturbance.

Results indicate that the location of campsite structures is the most important factor determining the size of disturbed area on campsites. Distance between wilderness huts and campfire sites explained the size of disturbed area, whereas the age of the campsite and number of visitors had no impact. The total disturbed area on campsites varied between different vegetation types, mountain biotopes being the most sensitive. Results suggest that the disturbed area can be minimized by locating campsites in trampling tolerant environments and by building the structures compactly within each campsite<sup>97</sup>.



PHOTO 9. Campsite at Pallas-Yllästunturi (©nationalparks.fi)

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<sup>&</sup>lt;sup>96</sup>Kakum National Park 2020., Eagles et. al 2002.

<sup>97</sup> Eagles et. al 2002.

*Use of estimation techniques for development planning, 46 Finnish National Parks* Nerg et. al (2012) have examined the impacts of socio-demographic, economic and park quality determinants on visits to nature areas. The authors applied panel data estimation techniques to Finnish data on 46 National Parks and Hiking areas between 2000 and 2008. 'Visits to nature areas', as a variable, reacted positively to the population size and quality features but negatively to gasoline prices and income level.

Of the age classes, the population share of 'young retirees' – people aged between 65 and 74 – increased the number of visits to nature areas significantly, whereas the share of 'baby boomers' – people aged between 55 and 64 – was insignificant in explaining the number of visits. Their findings assume that as the baby boomers reach retirement age, and assuming that their generation behaves like the young retirees in their study, the demand for national parks and Hiking Areas may increase substantially in the coming years which will increase the pressure to expand current parks<sup>98</sup>.

#### Applying use limitations of site, Snæfellsnes regional park

Snæfellsnes regional park is approx. two-hour drive from Reykjavik, Iceland. The park was established on 4 April 2014. The regional park has built a coastal route for visitors that is also aimed at engaging visitors with area's unique nature and important historical relics, while at the same time protecting the local people's identity and way of life. Places marked as holding utmost significance/ value/hold special significance to the locals are not placed on the map so locals can still enjoy those.



PHOTO 10. Oulanka National Park (©National Parks Finland)

<sup>98</sup>Nerg et. al 2012.

The route is based on specific sites that have been carefully selected by stakeholders. The coastal route is shown by numbers assuming that the tour starts at the Snæfellsnes visitor centre at Breiðablik, as most guests to Snæfellsnes arrive from the south, although guest can also arrive by ferry from the West fjords to Stykkishómur and they can also drive from the east. Sites are divided into A, B and C. All A and B sites were chosen with the consent of the landowner concerned and the planning authority / municipality concerned. These are aimed as follows:

- *A-sites* have been classified according to how well they are suitable for receiving tourists. There one can find certain infrastructure such as parking, signs, walking paths and proximity to toilets. Services such as food and accommodation are not far away.
- **B-sites** that are still under development and not yet finalized. They may fall within *A* or *C* sites
- **C-sites** are places that are known and used by certain tourism companies and access is only allowed by these companies. Either these companies own or use it with the permission of landowners. These sites are not promoted in any way.

#### Engaging all users of environments for better planning and management

The Retkikompassi project hopes to make possible participation and submitting of feedback to Metsähallitus or entrepreneurs in the region. This is being done via social map service under development since 2019. Nature experiences and user experiences concerning state-owned Hiking Areas can be shared in the service. It is a response to increased digitalisation among public sector operators, open data sharing and increasing interaction with citizens. The data saved in the system will be published later as open data. Development of the Retkikompassi project will continue in 2020<sup>99</sup>. The objective of the service is to make Metsähallitus' geographic information and related social media features available to all forest users.

Since the development is in initial phase, it would be important looking into similar tools and good practice examples from other protected areas that could help draft a more resilient system that will be beneficial and useful also in the future.

<sup>99</sup>Metsahallitus 2019.



FIGURE 15. Screenshot of social map (©Retkikompassi).

## 6.3. SOFT VISITOR MANAGEMENT APPROACHES

As visitors increase, so does the risk for biodiversity protection. While not all visitors to protected area categories I–IV by IUCN are in fact eco-tourists, in the absence of hard data and survey research the matrix can be helpful in planning and matching tourist strategies to protected area types.

Soft visitor management approaches are considered important in promoting education, learning and interpretation aimed at modifying the visitors' behaviour, over regulating actions<sup>100</sup>. Soft techniques can include education programmes focusing on the impact of the activities of visitors, often in combination with guiding, info-boards with information about the resources and the negative impacts certain behaviours can have, rules of conduct, etc.<sup>101</sup>.

Citizen science, a public participation in form of volunteer tourism is also gaining grounds today. It is seen as a more cost-efficient way of getting results while engaging visitors in learning. The scale can range from small projects (e.g. led by a single institution and involving one community of volunteers) to large ones (e.g. having international reach with volunteers from multiple countries). Sampling protocols are simple, asking volunteers to provide nothing more than 'snapshot data', which can be used to identify patterns and create databases<sup>102</sup>. Alternatively, protocols can be restricted e.g. to scientists or ecotourists if data is intended to contribute to solving a specific management or planning question. Citizen scientists are sometimes tourists

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<sup>&</sup>lt;sup>100</sup> Mason 2005.

<sup>101</sup> Mason, 2005; Marion and Reid, 2007.

<sup>&</sup>lt;sup>102</sup> Leung at. al 2018.

who have travelled to a protected area specifically for this purpose, but more often they are local outdoor recreationists who enjoy leisure opportunities in protected areas while at the same time contributing their energy and skills to science<sup>103</sup>. A synthesis of soft management methods can be found from table 17 below.

Soft visitor management approaches	Application/Tools			
-Identifying key places used by visitors -Analysing use patterns; mapping of traces of use, show potential trail deterioration damage and pollution sources (e.g. garbage, erosion) -Identify impact causing behaviour -Evaluating trails and key nature attraction sites most prone to trampling/erosion	-Spreading visitors across environments; marketing other national parks and Hiking Areas in the region -Time-based rerouting of visitors, e.g. hikers and mountain biking route markings, use of apps -Visitor count of visitors use-levels e.g. of lean-tos, stop-over and camping areas			
-Identifying pressure areas (e.g. predict daily average and maximum use level at the hotspots) -Identify best ecological communication places and methods -Managing use levels (e.g. zoning /reducing demand for problematic visitor uses)	-Strategic information dissemination; One way of reducing visitor pressures is by not placing all sites on the map. -Research on value areas; for locals and visitors, e.g. by mapping conflict areas Informing reasons for barriers/zones; sensitive habitats, during breeding season, site hardening			
-Identifying potential touristic uses -Facilitating communication between visitors and managers concerning site conditions/ conservation values -Targeting information/ strategic awareness for visitors -Preparing future management plans for the protected area (local Vs visitors uses and guiding actions)	-Visitor centre/Guest centre; engaging with visitors -Virtual reality of famous sites; importance, sensitivity, histories -Introducing interactive apps, e.g. citizen science apps for spotting degradation, invasive species, erosion, etc. -Storytelling; values/sense of place of region inhabitants to visitors			
-Following recreation activity and visitor behavior -Controlling use	-Limiting use of specific vulnerable sites; large events, large groups, adventurous activities -Limiting amount of parking places, e.g. For cars during peak season, and providing public transportation (limited timetables), or more parking for bikes/bicycle rent -Regulating disturbance causing visitor activities/products; favoring least polluting products, fire restrictions, etc. Limiting use, e.g. by requiring permits for certain activities, zones for certain uses, camping at designated sites -Limiting use of specific vulnerable sites; large events, large groups, adventurous activities			
-Characterizing influx and seasonality	Using indicators for Touristic and degradation; plan for more activities in line with site capacity -Creating dynamic experiences and routes, e.g. educational			
-Characterizing recreation related impacts -Mapping site degradation risk	-Visitor segmentation by characteristics; camping area designated for families with children, routes depending on degradation risk, etc.			
-Improving visitor experience/increasing supply opportunities -Offering greening messages	-Maps -Info-boards- with good practice guidance in strategic places -Encouraging longer stays over increasing visitor numbers			
-Controlling visitor traffic across all-natural environments	-Networking and cooperation; Working with area-based companies who provide services (e.g. guided tour favourability, packages services), voluntary agreements -Spirit of co-governance; working with tour operators also from outside the area that bring visitors to the protected area -Directing visitors to less visited attractions -Stimulate events in shoulder and low season -Limiting visitors to most fragile sites, e.g. within			

TABLE 17. Soft visitor management approaches.

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<sup>103</sup> Ibid.

#### Examples of soft-management approaches applicable to NKBR

#### Use of special biodiversity site characteristics for greening messages

Siikamäki et.al (2015) investigated ways to cope with the funding constraints of biodiversity protection from nature-based tourism, which is regarded as an important ecosystem service and an option for creating revenues for biodiversity conservation.

In their research, they found out that that Finnish national parks (NPs) with high biodiversity values were more attractive for visitors than parks with lower biodiversity values, providing evidence on the direct linkage between biodiversity protection and the provisioning of ecosystem services in protected areas. They found that the number of visits to NPs received annually, i.e., their attractiveness, was positively associated with the number of Natura2000 habitat types and occurrences of species considered threatened in Finland according to the International Union for the Conservation of Nature and Natural Resources (IUCN) Red List Categories and Criteria. Interestingly, recreational use also overlapped spatially with areas containing high biodiversity values: the number of occurrences of threatened species and Natura2000 habitat types were on average higher close to recreational routes than among randomly picked control areas within NPs.

Their results emphasise the need for careful planning and park management in protecting biodiversity in NPs, and in addition using the connections between biodiversity and recreational use of NPs (i.e. striking examples of "biophilia" and the human need for and love for nature) to engage the public more strongly with biodiversity issues<sup>104</sup>.

#### **Opportunities for greening messages, The River Cove campsite**

The River Cove campsite serves provincial, national, and international visitors. Most of the campsites in the area have toilets and shelters but have no power supply for lighting. In late 1980s lighting systems triggered by motion sensors and turned off by a delay switch were installed to extend camp-site use after dark. One was at a public shelter, and one at a public toilet. It is noted that visitors showed interest in the system, and asked questions about it, thus creating an opportunity to give out "green" messages<sup>105</sup>.

#### Citizen science and technology use in park management, Victoria Marine National Parks

Victoria Marine National Parks and Sanctuaries in Australia started the Sea Search citizen science project in 2005 to gather information about the health of the network of Victoria's marine parks and sanctuaries. Initially, volunteers collected data on paper datasheets in the field, which needed to be manually and laboriously entered in a database.

On 28.02.2018, a new app was launched on by the management to enable volunteers and citizen scientists to help management monitor Victoria's unique marine life and environments. The new app helps participants identify what they are seeing – from sea snails to fishes, octopuses to sea stars, and penguins to seals. This information is instantly uploaded from volunteers' phones or tablets to Parks Victoria for review and public release.

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<sup>&</sup>lt;sup>104</sup> Siikamäki et.al 2015.

<sup>&</sup>lt;sup>105</sup> Eagles et. al 2002., Alberta parks 2020.



PHOTO 11. Atlas of Living Australia BioCollect App. (© Park Victoria)<sup>106</sup>.

"Sea Search" is Parks Victoria's marine citizen science program directed to members of the public interested in science and research activities. It is used to collect valuable information on the state of Victoria's marine national parks and sanctuaries which contributes to biodiversity surveys on and in Victorian waters. Collected data is uploaded into the Atlas of Living Australia's (ALA) citizen science platform termed "BioCollect".

# Engaging local people on conservation, Almaty Nature Reserve

Almaty Nature Reserve occupies an area of 71,700 ha on the northern slope of Transili Alatau, one of the Northern Tien Shan mountain ranges. The reserve contains 1,100 species of higher plants and more than 50 of rare plants,

including 26 listed in the Red Data Book of Kazakhstan, a publication similar to Red list of endangered species.

For decades since its establishment in 1931, the nature reserve had no public access, and only allowed visits from research scientists and some educational visits for schools to the reserve's museum. The protectionist approach led to negative attitudes among the local population, because prior to the reserve's establishment, berry-, mushroomand fruit-picking took place, and these activities contributed significantly to family incomes. To promote more positive local perceptions about the protected area, the reserve staff adopted a strategy including environmental, educational, and public components.

The environmental component of the strategy focuses on the reasons for protection of the natural mountain complexes of the Transili Alatau, including its flora and fauna. The educational component includes close collaboration with the local school

<sup>&</sup>lt;sup>106</sup> Eagles et. al 2002., Alberta parks 2020.

in Talgar. The public component consists of important initiatives such as "March for Parks", close collaboration with the media and public bodies, and production of publications, leaflets, and brochures. Following 10 years since this approach, local perceptions about the reserve have been reported as more positive, with more than 50% of the population speaking favourably of the Nature Reserve<sup>107</sup>.

#### Engaging visitors through knowledge and skills-based interpretation, Samuel de Champlain and Mattawa River provincial parks

Samuel de Champlain and Mattawa River are two of Ontario, Canada's, 330 Provincial Parks. They are located on the Mattawa River, recognised today as a Canadian Heritage River. The Provincial Parks feature 200 camping sites, a store, more than 20 km of hiking trails, a back-country canoe route and a visitor centre. For a modest fee, visitors can participate in the Voyageur Adventure Tour programme.

Through first-hand experiential learning, including the replica voyageur canoe, paddles, storytelling, and period clothing of the voyageurs, participants gain an appreciation of Canada's history and develop a strong connection to the Mattawa River. Interpreters recall place-specific historic records, eliciting personal stories and experiences that provide a point of connection between today's visitors and the Mattawa River.

Participatory learning experiences like here are highly engaging for the participants, and incorporating skills helps avoid information overload as visitors are participate in both physical sense as they paddle, and in an intellectual sense as they discuss, question, and have fun<sup>108</sup>.



PHOTO 12. Voyageur Adventure Tour participants (Wikimedia Commons).

<sup>107</sup> Dzhanyspayev, 2006.<sup>108</sup> Dzhanyspayev 2006.

#### Engaging visitors' pre-travel; Practical information on diversity of site, Laponia World heritage and Laugavegur

Laponia World Heritage Area in Swedish Lapland comprises several different National Parks and Nature Reserves. The management has noted that some visitors choose to stay in one place over visiting several places<sup>109</sup>. To encourage visitors to explore the wider area of the heritage site, information about the different areas of Laponia are offered in the main page of practical information with bold title *"learn more before your visit"*. There are also engaging regulations concerning what one can do when in Laponia. For example, a phrase *"By following the regulations, you take part in preserving Laponia for future generations"*. Another example of engaging information can be seen on Icelandic Laugavegur's practical information guide. For example, contrary to many practical informations that come out as commands, a more mutual phrase *"The general rule is leave nothing but footprints on the trail and take nothing but pictures and memories"* is used<sup>110</sup>.

## Don't disturb – Don't destroy

Laponia is not a wilderness. People have lived here for many millennia without leaving any traces. Traditional knowledge is important in the World Heritage Site. It is the knowledge that has been passed on from generation to generation, teaching an approach to the land that allows us to be here without leaving marks.

- Show respect to the people living here. Avoid to rest or pitch your tent too close to close to settlements and villages.
- Hike along the trails if it is possible. The old trails are likely to follow the best route.
- The traisl are sparsely marked to not disturb nature. Do not make your own markings by stacking rocks.
- An árran (hearth) is often one of the traveller's many homes. For a long period, people have here eaten, rested, and found warmth and light. Do not take stones from an old árran to make a new one.
- If you wash upstream in a brook where others use the water, you pollute their drinking water.
- Litter does not disappear just because it cannot be seen. Do not bury it, but carry away what you brought here.
- Sacred places are still sacred, even though the way to use them has changed. To respect the place is to respect the people who live in Laponia.

FIGURE 16. Screenshot of Laponia website: information and guidelines for visitors (©Laponia).

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<sup>&</sup>lt;sup>109</sup> Laponia 2020.

<sup>&</sup>lt;sup>110</sup> Laugavegur 2020.

*Engaging educational websites about importance of conservation, Ecomare on Texel* In Ecomare's nature museum, one can learn lots about the Wadden Sea World Heritage, the North Sea and Texel. Ecomare is situated in the middle of the National Park Dunes of Texel. There is also information on various interesting areas of the national park<sup>111</sup>.

The information gives history of the nature and reasons behind its current protection and importance of the protection. The information is presented in simple format that it understandable to visitors, also younger ones. A phrase from the site:

"Venture out into the exposition Wadden City. Meet scientists and follow them in their search for answers. What do gulls eat? Who is the enemy of the mussel?..."



FIGURE 17. Screenshot of Ecomare website (©Ecomare).

Engaging visitors by story telling and "guest centre", Snæfellsnes Regional park

An abrupt influx of visitors to Snæfellsnes area also resulted in misconduct by some visitors e.g. peeping into local persons windows, visiting and littering special sites that have been in generations important to residents without sensitivity of local value and significance (lack of information). To improve visitor behavior, storytelling was initiated as a tool to engage visitors telling about the area they are visiting and more importantly the values of the region's inhabitants.

<sup>111</sup> Ecomare 2020.

# Spirit of place, we tell storys



FIGURE 18. Storytelling; values/sense of place and values of region inhabitants to visitors (©Snæfellsnes Regional park).

A "guest habour" is also built to offer information to both visitors and operators from outside the region that bring visitors to the area. They call it guest harbour not visitor centre. The idea behind it being that a "guest" invited to a place respects the host and their sense of place, i.e. concurrently respecting the environment to which one is invited by acting more responsibly towards it. "Guests" want to engage and ask direction e.g. how to do things and is keen to act like the host (follow suit).



FIGURE 19. Guest centre at Snæfellsnes Regional park (©Snæfellsnes Regional park).



FIGURE 20. Engaging with stakeholders (©Snæfellsnes Regional park).

#### Networking and co-governance, Snæfellsnes Regional park & Ilomantsi tourism association

In Snæfellsnes, Iceland, the guest centre is also used as a hub for sharing ideas and information between local managers, stakeholders, and tourism operators on issues that can create mutual benefit for both parties. i.e. the good state of environment needed by both locals for everyday life, and for business to operate long-term. In addition other forms of cooperation are also used. Such are events where companies from the region can showcase their products and services, and meetings with tourist operators.



FIGURE 21. Small companies working together to provide sustainable choices (© Ilomantsi Tourism Association/ SHAPE NPA).

In North Karelia Biosphere Reserve, Finland, Ilomantsi tourism association with its members (tens of small enterprises) and local associations have developed nondestructive tourism uses of the river and other nature objects and maintaining many typical, local cultural features in cooperation with the regional Biosphere Reserve. The aim is that when companies network to provide guided tours about nature and culture of the region, while giving opportunities for greening messages to visitors through their example; ensuring stop over places left clean before departure, favoring stops at local restaurant over packaged foods, in case packaging cannot be prevented, limiting single-use packages.

#### Target marketing to right segment per visitor profile

Gundersen et. al (2019) discuss a visitor survey conducted among Norwegians that showed that ecotourists, i.e. those travelling to relatively undisturbed or uncontaminated natural areas to enjoy nature, represent both the largest and the most environmentally concerned segment of all visitors. Their finding is said to be supported by a Swedish study showing that environmentally oriented individuals have different recreational preferences compared to others and prefer outdoor activities with little or no impact on the environment. They conclude that the examples suggest that there is a great potential for encouraging tourists to adopt more sustainable behaviors in protected areas by using management techniques specifically tailored to their profiles and preferences.

# *E-science tool for protected area management, cooperation between research institutes and park management*

Scientific information often entails complicated analyses and require high-level expert evaluation, which may limit their use in practical planning. In addition, there is lots of good research, but findings scattered across different organizations and research institutes. In their paper, Tolvenen et. al (2020) propose that scientific information should be integrated and, if necessary, simplified to fit the decision-making criteria as this way, the needs of different land uses can be assessed together and optimum activities be targeted for the areas with which they are best suited<sup>112</sup>.

<sup>112</sup> Tolvenen et. al 2020.

## 7. CONCLUSION

Biosphere Reserve management effectiveness is how it is being managed, meaning the extent to which it achieves the goals for which it has been designated. It is unlikely that all management objectives can reach their optimum values simultaneously why integrated monitoring approaches are required to tackle already existing and potential visitor pressures. One consequence of this approach is that management has focused on issues inside protected-area boundaries. There is an urgency to understand and measure how potential visitor pressures will affect protected area environments earlier enough to allow for early preparedness e.g. rethinking of more resilient plans and sustainable management strategies.

Nature tourism holds great economic potential for North Karelia's local economy. Protected area environments in North Karelia have increasingly become popular environments for visitors seeking outdoor relaxation and recreation with over 70 percent visiting the province also visiting the Biosphere Reserve. This trend is predicted to continue as current developments and strategies aim to develop nature tourism in the area. According to the current strategy, Koli target alone would attract ten times more visitors, meaning 2million visitors a year by 2050. Under a scenario that the visitors continue to favor same activities as presently, and that the peak seasons attract 70% of visitors as presently, Koli would expect to receive 24,000 visitors per day who favor similar environments.

On the other hand, protected areas have unique characteristics, the major one being sensitivity to human impacts and climate-change driven pressures. The impacts to natural environments across the Biosphere Reserve are currently minimal and visitor pressures manageable. However, under the scenario of continued growth in visitor numbers and linearity of land-use values by both visitor and residents in the area, a more integrated approach (planning, monitoring, evaluation and management) for handling potential visitor pressures that will contribute towards sustainable tourism consistent with the primary conservation objectives of the protected area is needed.

For example, considerable attention to the roles that residents and visitors can play, as well as tools that could help destination managers guide actions will be vital since north Karelia, unlike many global national parks, has public access rights which required a more diverse approach in mapping, monitoring, classifying and analysing impacts and pressure sources (e.g. conflict areas and touristic use loads) for better understanding and handling of visitor induced pressures.

The findings can be utilized in predicting and drafting possible future scenarios e.g. potential pressure sources and visitor hot spots for biosphere protected areas (i.e. core areas and buffer zones) that could assist the region plan for pressures earlier in advance (e.g. what resources might be needed, and how they could be sourced). Huge amount of data already exists on origin of Biosphere Reserve visitors. These can for example be analysed against already known visitor consumption classifications by country of origin (e.g. ecotourists, nature tourists) and new emerging trends (megatrends) which could help strategize plans, marketing, and site communication. Biosphere Reserve status legitimacy and Metsähallitus successful operation can be ascertained if the stated differing expectations brought up here can be reconciled.

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s		2019	1482	4423	10960	958	494	390	1016	565	740	337	429	822	1085	452	1597	1820	529	59	452
		2018	1562	4551	10741	983	439	568	606	572	838	267	419	961	1063	554	1381	1145	617	116	254
		2017	1716	3907	11044	927	609	594	925	491	925	404	326	902	1192	503	431	1302	527	112	202
		2016	1272	3769	11469	863	475	282	853	446	738	375	263	1034	1078	433	279	818	355	132	202
		2015	1582	3840	12942	1120	566	1382	987	491	677	423	391	1537	1414	466	350	252	405	64	131
		2014	1603	3636	24913	1113	633	416	793	396	739	310	421	1117	768	336	371	226	276	70	111
		2013	1292	3092	31390	837	442	301	1027	492	649	235	290	1086	781	325	159	189	276	91	133
		2012	1423	3298	28965	602	422	359	1107	437	736	257	289	1055	966	317	227	279	293	96	125
		2011	1134	3215	19365	536	444	279	1131	491	531	218	284	633	906	508	149	223	254	148	124
		2010	1134	3331	14154	522	326	216	926	410	773	338	282	719	867	511	209	196	173	82	87
	Arrivals	2009	887	2908	10306	551	283	204	842	464	608	242	282	417	915	337	164	321	256	113	49
		2008	1198	3492	9890	895	369	186	1192	478	634	349	288	566	1104	670	155	251	251	114	64
		2007	1324	3542	7850	1080	448	324	1620	720	827	408	290	684	1149	728	197	335	257	146	48
		2006	1293	3757	6329	1069	447	379	1574	752	824	486	333	622	1098	861	159	350	252	103	145
		2005	1547	4553	4617	926	524	353	1489	619	743	280	371	400	1551	953	140	315	247	138	115
		2004	1832	3939	4459	1251	423	263	2150	642	837	496	259	574	1435	669	144	297	520	169	119
		2003	1581	4607	4410	1225	524	303	2252	774	840	412	349	325	1045	892	216	275	247	113	53
		2002	1364	4717	4507	1074	371	273	1485	677	790	336	382	366	918	587	95	408	196	74	48
		2001	1848	3993	4661	1181	538	280	1158	815	804	233	398	332	1061	259	132	297	186	121	83
		2000	1836	3875	5037	1166	584	392	1036	912	905	172	502	349	910	251	231	258	216	155	41
		1999	1743	4458	4783	1121	514	982	1149	780	854	167	518	184	827	361	215	304	298	193	35
		1998	1676	4407	5594	1016	438	472	1419	772	838	198	442	168	878	321	147	252	210	117	
		1997	1616	4412	5691	797	533	269	1046	581	735	175	493	212	875	278	140	299	308	189	116
		1996	1431	4674	4779	708	482	297	1235	665	894	164	415	261	775	270	155	293	270	116	37
		1995	1641	5240	3969	880	655	318	1255	644	716	290	289	272	1018	292	176	294	599	154	76
			Sweden	Germany	Russia	United Kingdom	United States	Norway	Netherlands	Italy	France	Japan	Denmark	Estonia	Switzerland	Spain	Poland	Austria	Belgium	Canada	China
										North	Karelia										

Appendix 1. International arrivals to North Karelia 1995–2018 (source; Statistics Finland).

## Appendix 2. Proposed framework for analysing potential touristic uses (PTU)

(Criteria, indicators, and parameters for quantitative assessment of potential touristic uses).

POTENTIAL TOURISTIC USES (4=high potential, 1=low potential)									
Criteria/ indicators	Paremeters								
KoNP (Koli), RuHA (Ruunaa), PaNP (Patvinsuo), PeNP (Petkeljärvi)	KoNP	RuHA	PaNP	PeNP	weight				
1. Vulnerability									
The key natural elements of the site present no possible deterioration by visitor activity					4				
There is the possibility of deterioration of natural environment by visitor activity					3				
There is the possibility of deterioration of main attraction elements by visitor activity					2				
There is the possibility of deterioration of all-natural elements by tourism activity					1				
2. Accessibility									
Site located less than 100 m from a paved road and with bus parking					4				
Site located less than 500 m from a paved road					3				
Site accessible by bus but through a gravel road					2				
Site with no direct access by road but located less than 1 km from a road accessible by bus					1				
3. Use limitations									
The site has no limitations to be used by locals and tourists					4				
The site can be used by locals and tourists but only occasionally					3				
The site can be used by locals and tourists but has limitations (legal, restrictions on max visitors/year, number of people per time to key attraction)					2				
The use by locals and tourists is extremely hard to accomplished due to limitations difficult to overcome					1				
4. Safety (hiking trails, rest places, camping area)									
State of support structures are in exceptional condition					4				
State of support structures are in good condition					3				
State of support structures are in satisfactory condition					2				
State of support structures are in poor condition					1				
5. Logistics									
Accommodation possibility and restaurants for groups of at least 50 persons less than 15 km away from the site					4				
Accommodation possibility and restaurants for groups of at least 50 persons less than 50 km away from the site					3				
Accommodation possibility and restaurants for groups of at least 50 persons less than 100 km away from the site					2				
Accommodation possibility and restaurants for groups less than 25 persons and less than 50 km away from the site					1				
6. Population density									
Site located in a municipality with more than 1000 inhabitants/ km2					4				
Site located in a municipality with over 250–1000 inhabitants/ km2					3				
Site located in a municipality with 100–250 inhabitants/ km2					2				
Site located in a municipality with less than 100 inhabitants/ km2					1				
7. Association with other values									
Availability of several nature and cultural sites less than 5 km away from the site					4				
Availability of several nature and cultural sites less than 10 km away from the site					3				

Availability of one nature and one cultural site less than 10 km away from the site		2
Availability of one nature and one cultural site less than 10 km away from the site		1
8. Scenery visibility		
Site marketed actively as a tourism destination in national campaigns		4
Site occasionally marketed as a tourism destination in national cam- paigns		3
Site currently marketed as a tourism destination in local campaigns		2
Site occasionally marketed as a tourism destination in local campaigns		1
9. Uniqueness		
The site shows unique and uncommon features considering this and neighbouring countries		4
The site shows unique and uncommon features in the country		3
The site shows common features in this region, but they are uncommon in other regions of the country		2
The site has features rather common in the whole country		1
10. Observation conditions		
All nature elements can be easily observed		4
There are some obstacles that make difficult the observation of some nature elements		3
There are some obstacles that make difficult the observation of the main nature elements		2
There are some obstacles that almost obstruct the observation of the main nature elements		1
11. Interpretative potential		
The site presents conservation values only understandable to environ- mental experts		4
The public needs to have solid background information to understand the conservation principles of the site (e.g. requirement by law)		3
The public needs to have some background information to understand the conservation principles of the site		2
The site presents conservation values of nature elements in a clear and expressive way to all types of visitors		1
12. Economic level		
The site is in a municipality with a household income at least the double of the national average		4
The site is in a municipality with a household income higher than the national average		3
The site is in a municipality with average household income within nation's median household income		2
The site is in a municipality with a household income lower than the national average		1
13. Proximity of recreational areas		
Site located less than 20 km from another recreational area or tourist attraction		4
Site located less than 15 km from another recreational area or tourist attraction		3
Site located less than 10 km from another recreational area or tourist attraction		2
Site located less than 5 km from another recreational area or tourist attraction		1
TOTAL		100

## Appendix 3. Proposed risk tool for quantitative assessment of potential degradation risk (DR)

(Criteria, indicators, and parameters for quantitative assessment of potential degradation risk).

DEGREDATION RISK (4=high risk, 1=low risk)											
Criteria/ indicators Paremeters											
KoNP (Koli), RuHA (Ruunaa), PaNP (Patvinsuo), PeNP (Petkeljärvi)	KoNP	RuHA	PaNP	PeNP	weight						
<b>1. Deterioration of key nature attractions</b> (e.g. water, ice, snow, sensitive habitat conservation, endangered species)											
-Possibility of deterioration of all nature attractions (water, sceneries, nature quality)					4						
-Possibility of deterioration of the main nature attractions					3						
-High possibility of deterioration of secondary nature attractions (rest/ camping areas/ hiking routes)					2						
-Minor possibility of deterioration of secondary nature elements					1						
2. Proximity to areas with potential to cause degradation											
(e.g. forestry, mining, industrial fac	iiiiies, road	is, urban a	(reas)								
activity					4						
-Site located less than 200 m of a potential degrading area/ activity					3						
-Site located less than 500 m of a potential degrading area/ activity					2						
-Site located less than 1 km of a potential degrading area/ activity					1						
3. Legal protection											
-Site located in an area with no legal protection and no control of access					4						
-Site located in an area with no legal protection but with control of access					3						
-Site located in an area with legal protection but no control of access (i.e. everyone enjoys the right to use site irrespective of ownership)					2						
-Site located in an area with legal protection and control of access					1						
4. Accessibi	lity										
-Site located less than 100 m from a paved road and with bus parking					4						
-Site located less than 500 m from a paved road					3						
-Site accessible by bus through a gravel road					2						
-Site with no direct access by road but located less than 1 km from a road accessible by bus					1						
5. Population density											
-Site located in a municipality with more than 1000 inhabitants/ km <sup>2</sup>					4						
-Site located in a municipality with 250–1000 inhabitants/ km <sup>2</sup>					3						
-Site located in a municipality with 100–250 inhabitants/ km <sup>2</sup>					2						
-Site located in a municipality with less than 100 inhabitants/ km <sup>2</sup>					1						
TOTAL											

