

**Title: Tourism resort users' participation in planning: Testing the public participation geographic information system method in Levi, Finnish Lapland.**

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**Abstract**

It is a challenging task to get tourists involved in tourism planning. In addition, it is often believed that local authorities and tourism companies have an adequate understanding of what tourists prefer or need and how local people's interests can be integrated in tourism planning. Regardless, the tourism business is simply dependent on tourists – whether they want to come to a resort again or not. This article examines how the method of internet-based public participatory geographic information system (PPGIS) serves in gathering tourists' and locals' views about their favourite places at the Levi tourism resort in northern Finland. By using the PPGIS method it was not only possible to find clusters of favourite places, but also several single places of interest. The study revealed technical challenges in using PPGIS software. The quality and usability of the information and the method are discussed in relation to tourism planning.

**Highlights**

- Social hot spots were found via PPGIS enquiry
- The areas with the highest natural values got most of the attention
- Social media was an effective way to advertise the PPGIS enquiry to tourists
- People had more difficulties putting their ideas on a map than answering verbal questions

**Keywords**

PPGIS, map enquiry, tourism planning, tourism resort, hot spot, Lapland, Finland

## 1. Introduction

Tourism resorts represent a specific challenge for planning since they often exist as enclaves in the middle of rural areas. Resorts have many stakeholder groups which differ from the surrounding regions and may be difficult to define. When a tourism area is in a developing process, one challenge concerning the sustainable issues is the speed of growth (Swarbrooke 2005). How is it possible to plan and build tourism areas and their infrastructure in a way that takes into account ecological, economic, social and cultural sustainability? How is it possible to make sure that local people and stakeholders have opportunities to affect the issues that concern them? The issues were stressed by the World Tourism Organization (1998) in its envisagement for managing “all resources in such a way that economic, social and aesthetic needs can be fulfilled while maintaining cultural integrity, essential ecological processes, biological diversity, and life support systems”. In other words, managers of tourism resorts are expected to make socially sustainable choices when striving for growth.

The tourism business's focus on the winter season and snow-based activities creates big significant challenges for several reasons (e.g. Baum & Hagen 1999; Lundtorp, Rassing & Wanhill 1999) compared to the snowless seasons (summer and autumn in Finnish Lapland). The capacities of accommodation and other services are maximized during fully booked seasons, however they are underutilized during summer. Routes are mainly planned for the needs of winter activities (cross country skiing, snow-shoeing, snowmobiling), even though the need for the routes is different in snowy versus snowless seasons. Finally, the supporting infrastructure of the resort that serves snow-based activities (e.g. ski lifts and slopes) may be aesthetically unappealing during other seasons. Moreover, due to the seasonality of tourism, it may be difficult for the tourists and tourism workers to become attached to an area.

Usually, experts', entrepreneurs', and nowadays more often also local people's needs concerning resort development are inquired about, but tourists and long-term visitors, such as second home owners, are not often taken into account in a destination development process (Hall & Müller 2004; Rinne, Kietäväinen, Tuulentie & Paloniemi 2014). However, their silent knowledge can benefit planning processes.

Tourism has become an important livelihood for local people. At the same time, the areas where tourists visit have meanings in traditional livelihoods, local history and culture; hence residents' opinions should be widely heard during the development process, as Brown and Weber (2013) argued. According to the principles of community-based tourism (e.g. Jamal & Getz 1995; Blackstock 2005; Okazaki 2008), collaboration between local inhabitants, decision makers, and other stakeholders is essential to improving socially sustainable tourism.

In order to attract tourists to the area repeatedly, it is important to listen also to tourist's wishes and voices in tourism area planning. Tourists who return to the same places can develop strong attachments to them (Oppermann 1998; Tuulentie 2007; Yuksel, Yuksel & Bilim 2010). They also gain significant practical knowledge about the use of the areas around

the resorts. Coming from different backgrounds, tourists represent, however, a heterogeneous group having ideas and wishes that are not that easy to comprise in tourism area planning.

There are several participatory planning approaches on tourism growth available to enhance sustainable tourism development (e.g. Murphy 1988; Selin 1999). Even though there have been many attempts to involve tourists in planning processes, e.g., through public meetings, hearings, workshops, surveys, personal and focus group interviews (see Randolph 2004), and mapping techniques (e.g. Uusitalo 2010; Wolf, Wohlfart, Brown & Lasa 2015), one problem has usually remained. The participatory methods have not reached a wide audience.

One method designed to involve more people is a public participatory geographic information system (PPGIS), which makes it possible to locate experiences, discussions and opinions on a map. PPGIS is a sub-branch of geographic information systems (GIS) and has been used a lot in different types of land use planning (see McCall 2015a; McCall 2015b).

This article asks: *How does PPGIS succeed in (1) reflecting users' favourite places and (2) collecting users' knowledge on a nature-based tourism resort?* These questions are addressed specifically to the discussion of what PPGIS contributes to tourism resort planning in sparsely populated areas.

## 2 The idea of tourists' participation in planning

The issue of public participation in planning has been on the agenda for a long time, but more so during the last three decades. The so-called communicative paradigm (e.g. Healey 1992) points out that planning should be inclusive and interactive, and the basic idea is that people have to have a say in decisions that affect their lives (Hanna 2000; 2005). This is nowadays a widely shared principle, which has also been applied to legislation (see e.g. Finnish Land Use and Building Act, 132/1999; Lane 2005).

Arnstein's (1969) seminal work on the ladder of participation with three levels – non-participation, tokenism and citizen power – has been developed since its presentation, and shortcomings such as ignoring the existence of different relevant forms of knowledge and expertise have been discussed (Tritter & McCallum 2006). Ideally, the attempt has been to proceed from simple one-way information providing to support decision-making towards a two-way process of dialogue and empowerment of communities (Hanna 2000). Worries have been raised in relation to who are the relevant participants and whose voices are heard in the participation process (Marzuki, Hay & James 2012; Reed, Graves, Dandy, Posthumus, Hubacek, Morris, Prell, Quinn & Stringer 2009). Moreover, the role of public participation in planning is place-specific and largely determined by the nature of the planning enterprise being undertaken (Healey 2004; Lane 2005). Also, the role of delivering information and knowledge is crucial (Bruckmeier & Tovey 2008).

Participation in tourism planning can be seen as a distinct case since tourist resorts are often located in rural areas and differ in character from the surrounding areas with their seasonal population and seasonal use (Saarinen 2003; Tuulentie & Mettiäinen 2007). However, participation is highlighted through adaption of a sustainable planning approach, which integrates physical planning into the community planning tradition and provides a new approach to economic growth of resorts (Hall & Page 2006).

Community-based tourism emphasizing local control has been studied a lot (see e.g. Jamal & Getz 1995; Okazaki 2008; Dredge & Jamal 2015) and the idea is widely shared that communities, especially in developing countries, must have a say in the process of development. In order to pass the control over the uses and benefits of key resources to locals, the tradition involves also communities and local stakeholders in tourism development and management (Scheyvens 1999, 2002; Kauppila, Saarinen & Leinonen 2009). The process empowers local and often small-sized providers of nature-based activities (Ateljevic & Doorne 2000; Lundberg & Fredman 2012). Additionally, the values, interests and preferences of users (i.e. residents and tourists) are taken better into account.

The need to involve residents in planning is generally discussed with two main arguments: 1) their participation can enhance the legitimacy of the planning institution and 2) produce knowledge needed for creating well-informed plans (Forester 1993; Faehnle 2014). Especially the latter argument applies to the tourists' views as well, since tourist resorts are specific entities characterized by a small permanent population in the off-season, but a high amount of users during the peak season using the environment in various ways. Thus, the question of relevant participants is more complicated than in a 'normal' community. The focus of this study is, firstly, to inform tourism entrepreneurs and resort planners about the tourists' actual uses and preferences concerning nature areas around the resort, and, secondly, to make it possible for regular tourists and second home owners to include their views in the planning process.

### 3. PPGIS as a tool in tourism resort planning

As Longley, Goodchild, Maguire & Rhind (2001: 2) have argued, knowing *where* something happens is critically important. When we know which place we are talking about, discussions are more fluent and phenomena and opinions do not just happen abstractly somewhere. GIS enables the interactive mapping of the attributes of an area and this information can be utilized in the planning and decision-making processes (Boyd & Butler 1996: 380; Heywood, Cornelius & Carver 1998: 12). GIS development originated from an interest in managing the urban environment and balancing competing uses of environmental resources. In other words, GIS includes two main aspects, which are location, i.e. information telling where something is, and attribute information identifying the location (Star & Estes 1990). GIS offers a useful tool to compare different types of data through visualization but is not an automatic solution for all land use planning (Ball 2002).

A need for participatory planning and participatory GIS has been born from the critique saying that the opinions of local people are not adequately taken into account in decision making (National Center for Geographic Information and Analysis 1996). The aim of the PPGIS is to engage “the public in decision-making through its goal to incorporate local knowledge, integrate and contextualize complex spatial information, allow participants to dynamically interact with input, analyse alternatives, and empower individuals and groups” (Sieber 2006: 503).

The power of PPGIS is to describe places which have some subjective meaning for a respondent without trying to identify physical landscape characters (Brown 2016). Through PPGIS it is possible, for instance, to locate and make visible important places in the area (Brown 2004; Alessa, Kliskey & Brown 2008). The ideal is that by using the map-based methods silent and loud voices will be heard equally (Brown 2006). Consequently, the issues which are handled by PPGIS are often also emotionally charged and hence it is important to protect the anonymity of responses when sensitive topics, e.g. those concerning minorities, are in question (Ball 2002).

PPGIS methods have been used in hundreds of city and rural area studies and plans (see McCall 2015a; McCall 2015b). Examples of PPGIS-studies include natural resource management (Kangas & Store 2003; Edwards & Smith 2011), regional planning (Hansen & Reinau 2006; Brown, Weber & de Bie 2014), conflict management (Gudes, Stern & Svoray 2004; Brown & Raymond 2014), socio-ecological hot spot mapping (Alessa et al. 2008) and conservation planning (Pocewicz et al. 2012). Although the possibilities of using GIS in tourism planning have been recognized years ago (Boyd & Butler 1996; Bahaire & Elliot-White 1999), PPGIS method has been used in tourism planning only recently. There are some examples of using PPGIS in national park or natural area planning (Brown & Weber 2011; Brown & Weber 2013; Tolvanen et al. 2014; Wolf et al. 2015), the perspectives of local communities and citizenships toward tourism development (Stewart, Jacobson & Draper 2008; Ricker, Johnson & Sieber 2013). In addition, visitors’ assessments of the negative impacts of tourism have been mapped in Finnish national parks (Pietilä & Kangas 2015; Pietilä & Fagerholm 2016).

PPGIS can be used both in internet-based map and traditional paper map enquiry. Internet enquiries asking the place-based opinions of local people and residents are more cost-effective compared to their paper map counterparts (Brown & Weber 2013). On the other hand, paper map enquiries have a better response rate than those that are internet-based (Pocewicz, Nielsen-Pincus, Brown & Schnitzer 2012). Brown (2012) has neither found a significant increase amongst a response rate in electronic enquiries.

Similarly to other enquiry methods, a challenge in the use of PPGIS is representativeness. Brown (2016) found PPGIS yielded the highest responses from those people whose livelihood was closely related to the topic in question, e.g. tourism entrepreneurs in tourism planning. In other words, the responses reflect the interest in the issue, which is also known as the NIMBY (not in my backyard) phenomenon. According to Hansen & Reinau (2006), PPGIS studies have usually reached middle-aged, highly educated men, whose incomes are

above average. In Western countries, this kind of population group comprises only five percent of all adults.

Indeed, the attitudes of authorities are a more important issue in the implementation of this type of method improving near-democracy (Rantanen & Kahila 2009; Wood 2010; Hysing 2013; Brown & Kyttä 2014). When it comes to environmental questions, authorities often think that they have the most relevant knowledge (Hysing 2013). Hence, the key questions here are whether authorities and land use managers are ready and motivated to undertake time consuming cooperation with locals and what kind of information is considered as fact-based knowledge about the environment (Rantanen & Kahila 2009; Pellizzoni 2011; Faehnle 2014). Fact-based knowledge has often been thought of as opposite to emotional-based knowledge. Hence, people's emotionally loaded or emotional-based knowledge is seldom seen as relevant and has often been seen as a threat to economic development. (Wood 2010: 164-165). Consequently, the use of the PPGIS method is a question of a broader power play.

In this research, social spatial data and non-measurable information concerning locals' and tourists' favourite places and ideas were asked via the PPGIS method. Especially tourists are a group not typically involved in resort planning. The questionnaire and participation were implemented to develop new services in a nature-based tourism resort. This enabled tourists and local people to participate in the execution of the Levi 4 strategy related to the development of wellbeing, summer and autumn tourism in Levi. The PPGIS was put into practice via internet-based enquiry. The information was utilized in product development workshops with Levi's tourism entrepreneurs.

#### **4. Case study area: Levi tourism resort**

The Levi tourism resort in northern Finland, Lapland, was selected as a PPGIS case study area for several reasons. Levi is located in the municipality of Kittilä in north-west Finnish Lapland above the Arctic Circle and close to Kittilä airport. The geography of Levi is hilly (Figure 1). The biggest free-flowing river inside Finnish borders, Ounasjoki, flows beside the resort village. The natural features and location make the area attractive as a nature-based tourism destination. Based on visitor numbers, Levi is among the biggest tourism resorts in the Barents Region (Regional council of Lapland 2015). Kittilä municipality has been one of the frontiers in land-use management of tourism planning, because it has been goal-directed in steering the land use of Levi with land acquisition and the local master plans since the early stages of resort development. Similarly to other ski resorts, Levi has pursued overcoming the seasonality of the tourism business. Due to these efforts, there an abundance of ecological spatial data exist, but only a little social spatial data have been collected in the area (e.g. Rantala & Uusitalo 2007; Tuulentie & Mettiäinen 2007).



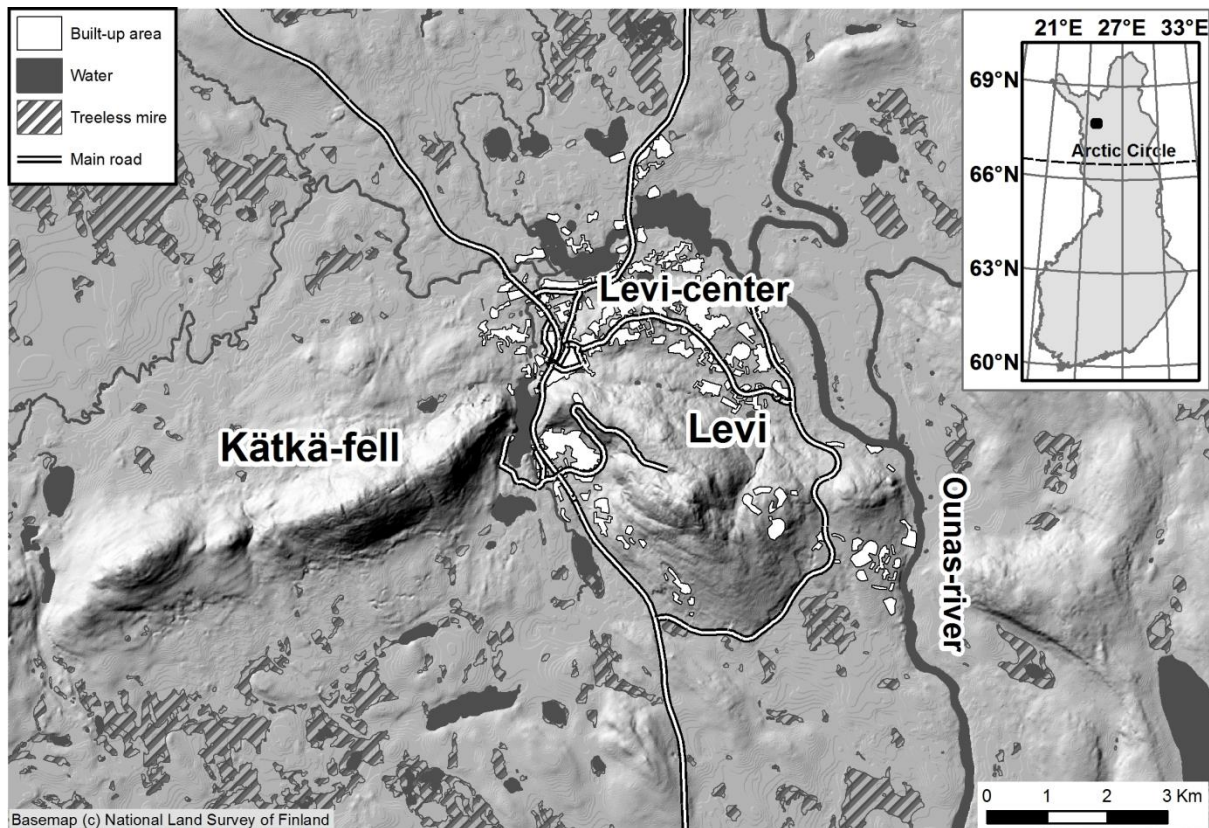


Figure 1. Levi area

Because of Levi, the tourism industry is the largest employer in Kittilä besides mining. Levi and its adjacent village, Sirkka, have around 900 permanent inhabitants, 24 500 beds for tourist accommodation, 15 000 restaurant seats and about 200 tourism companies in and nearby the village (Kittilä 2016; Lapland above ordinary 2016). In addition, there are 3 000 second homes, which are used by the owners but many are also available for rent. Due to its assets Levi has become one of Finland's most popular all-year tourist resorts. In 2015 there was a total of 600 000 registered travellers, of which 126 400 were registered travellers (21%) during the summer and autumn seasons of 2015 (May–October). About 30% of visitors were international and 70% Finnish (Levi tourist information centre 2016).

The majority of tourists visit Levi in the winter season even though tourism products for the low seasons have been developed in the area. Seasonality has been one of the main drivers of the recent development projects carried out through EU and national projects, such as the Landscape Lab focusing on the ecological, visual and social impacts of tourism (Uusitalo, Sarala & Tuulentie 2006), the river Ounasjoki development project, the Clim-ATIC project looking at the tourism development from the climate change point of view, and Levi Digit, the electronic business development project (Kideve Elinkeinopalvelut. Hankkeet. 2016). The latest project '*Forests and Greenroofs – Ecosystem services of wellbeing tourism*,' in which Levi functions as a pilot area, was launched in 2015 by Natural Resources Institute Finland (Luke), Kideve Kittilä Development and the local tourism companies. The data from this article has been collected in this EU project, which focused on the identification and



development of sites and programme services that increase tourists' wellbeing and health (Voimametsistä viherkattoihin 2015).

## 5. Data and methods

In order to learn about places with tourism and recreation values, ecological and physical spatial data were gathered first from existing data sources. The collected data included, e.g. the hiking routes of the area, habitat network utilized by wildlife and other areas with high ecological value. Second, tourists' and local people's favourite places in the Levi area were inquired using the internet-based PPGIS map questionnaire software. It was further expected in the project, based on previous studies and statements (e.g. Millennium Ecosystem Assessment 2003), that tourists' wellbeing is dependent on how resorts' ecosystems work and biodiversity is one indicator of functioning ecosystems. A network of natural areas including valuable environments for tourism and recreation activity programmes during the snowless seasons was identified by combining ecological and social values (Kideve 2016). This article is focused on the production of information on social spatial data related to tourists' and recreationists' perceptual values, i.e. users' spatialized wellbeing experiences, landscape values and improvement suggestions.

For the map questionnaire, the Harava software tool was used. It is possible to formulate map questions with multiple choices as well as open questions in Harava. Respondents' age, gender, travel company, mode of travelling, trip duration, living environment and activities in the Levi area during summer and autumn were inquired as background information including how they got to know about the enquiry. The map questions concerned the locations of respondents' favourite places, what makes them special, activities involved at the sites, and ideas for developing them. Additionally, the use of routes and hopes for new routes were inquired.

The questions were grouped into nine themes, each theme represented on its own page. Four themes were map tasks (M). The nine themes were:

1. Introducing the inquiry
2. Respondent's background
3. Favourite place: Levi surroundings (M)
4. Favourite places: Levi centre (M)
5. Usage of existing trails (M)
6. Suggested new trails (M)
7. Interesting services
8. Feedback about the mapping tasks
9. Lottery information

There were not any mandatory questions, so it was possible to move between pages freely. A respondent was able to make markings on the map that covered an area of about 20 kilometres from Levi centre. According to the pre-tests, responding to the enquiry took approximately 20 minutes. It was possible to answer both in Finnish and in English.

The enquiry was publicly open on the internet from July to September 2015. The period included two events that attracted potential tourists having special interests in wellbeing issues. The enquiry was promoted during sport festivals as well as through social media, tourist companies' webpages, leaflets, flyers, local newspapers local companies and the tourist information centre assisted in advertising the enquiry and collecting the data.

Altogether 235 people of whom almost all were Finnish replied to the questionnaire (only five foreign respondents) by clicking the button 'Send enquiry' (Group A). A total of 200 responses (85%) were received from tourists including the owners of second homes. The rest (13%) were local entrepreneurs, seasonal workers and inhabitants. The average age of the respondents was 43 years. Almost three quarters of the respondents were women (Table 1). Altogether 105 different people (45 %) made 309 point marks and 75 route marks on the maps and 130 people (55 %) did not make any marks. The number of marks varied from 1–15 per respondent.

The tourist respondents were divided into three different groups: the holiday home owners who were considered as half locals (total of 24 respondents), tourists with more than three visits (37 resp.) and tourists with 1–3 visits (127 resp.) in Levi. 12 respondents did not give their background information. Altogether, 65 % of the respondents got to know about the enquiry through social media.

Table 1. Background data (Group A)

<b>Gender distribution</b>	<b>%</b>	<b>n</b>
Women	71	166
Men	28	66
Missing data	1	3

#### **Locals / Tourists**

Local entrepreneurs, local seasonal workers and local inhabitants	13	30
Tourists and the owners of the holiday homes	85	200
Missing data	2	5

#### **Tourists according to visits in Levi**

Holiday home owners	12	24
1–3 visits	18.5	37
> 3 visits	63.5	127
Missing data	6	12

Furthermore, the enquiry had been opened or partly replied to 234 times without clicking the button 'Send enquiry'. Among this Group B, altogether 85 people (36%) had either checked the first page of the enquiry or opened some pages, but had not answered any questions. These openings involved testing the functionality of the enquiry by the questionnaire designers. The responses of the rest (149 people) were analysed. Group B was rather similar to Group A with respect to gender, the respondents' ages and the relation of local inhabitants and tourists.

The spatial analysis was performed using the ESRI ArcGIS for Desktop v10.3.1 software. The Point Density (PD) tool was used on the marked favourite points in order to identify social hot spots. PD calculates a magnitude-per-unit area from point features that fall within the neighbourhood around each point. Because it was possible to mark the favourite points in the enquiry on various map scales, the locational precision of points may vary. The precision of points in the PD analysis can be controlled with the neighbourhood radius parameter. The neighbourhood radius of 500 metres was used. The result of the PD analysis tool is a continuous raster layer where each pixel has the point density value in *points per km<sup>2</sup>*. After PD the density values were extracted to points. The density value was used to organize the points into spatial groups (hot spots) as shown in Figure 2. Favourite points located outside the buffer were referred to as single points (Fig. 3). The single points were identified from a continuous point density raster surface by using the Point Density tool with a 500-metre radius. From the resulting density raster pixels containing the value of 10 points per km<sup>2</sup> or more were converted to polygons. A buffer of one kilometre was created around the polygons. Favourite points located outside the buffer were selected as single points for further analysis.

Moreover, the number of replies per theme was counted in order to evaluate the validity of internet application of the PPGIS method in tourism planning. For example, feedback about the mapping tasks included questions about the uploading, zooming and moving the maps, the finding and locating points on the map, marking a place and route on the map, and possible problems with internet connectivity. The sliding clutches of these questions were made for the evaluations. The set of questions included also the open question "If you felt that the mapping tasks were difficult, please describe the problem(s) in more detail".

## 6. Results

### 6.1 Main hot spots and single points of interests

Totally there were given 306 marked map points, 62 route marks and four new route suggestions to the enquiry by 105 different respondents. Three main hot spot areas were identified by analysing the locations of the favourite places (n=299) with the Point Density method (Fig. 2). Those areas include a wilderness area (A, composed of 24 favourite places), the traditional village Sirkka from where the resort centre originated (B, n=26) and the top of the fell with sceneries that were found to be attractive (C, n=60). In all hot spots – even the

urban-like and densely-built Levi centre – natural characteristics and closeness to nature were highlighted by the respondents in their descriptions of the sites.

The most important values of the summit of the fell Kätäkunturi (A) were attached to natural landscape, hiking, nature in general and good accessibility. The fell Kätäkunturi is about 500 metres high and located close to the lake Immeljärvi and Levi centre. Compared to the Levitunturi fell, Kätäkunturi has remained without constructions. Hiking routes are available around the fell and it is a good destination, for example, for day hiking trips. The Sirkka village (B) shows that many favourite natural places are located very close or even inside the built-up areas constituting the resort centre. The most positive values were attached to the lake Immeljärvi, Levi centre with many services (spa, many restaurants, hotels, etc.) and nature nearby the centre. The most attractive issues of the summit of Levitunturi (C) were related to the views, a 600-metre-long trail on the top and good accessibility.

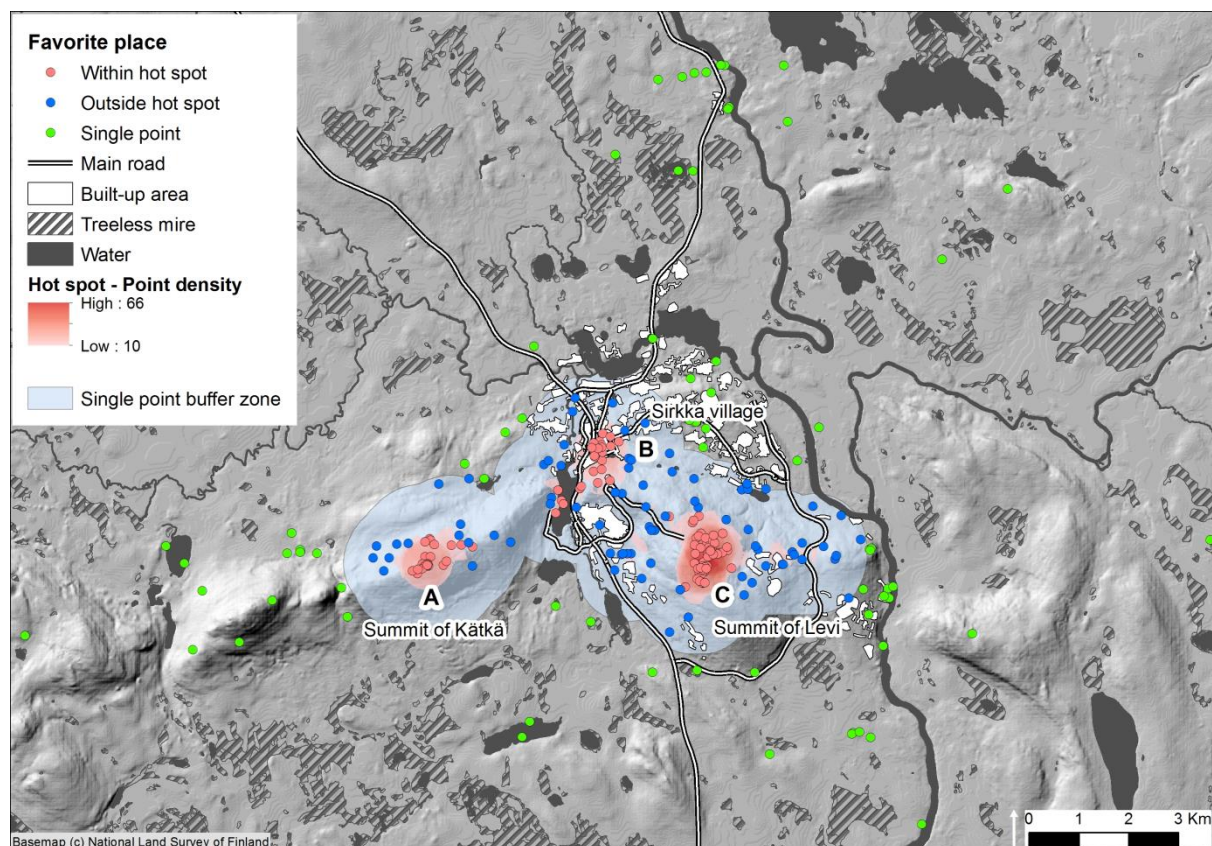


Figure 2. Favourite places, social hot spots and single points

In addition to the hot spots, there were many interesting separated single spots ( $n=106$ ), which represented less-used areas but were perceived to have special characteristics (Fig. 2). Spots included also many improvement suggestions. Close by the Levi resort, rivers were considered as important. Canoeing, fishing, camping and walking on and close by the river were seen as favourite activities and places: *“A beautiful island and the crossing of the [Ounasjoki] river. Would it be possible to build a camping place there?”* *“Kapsa-river: the river is good for canoeing. I’d like to seize the initiative with the accessibility of the upper reach.”* *“Korsa-river: a great small river where there are lots of small fish. It should be*

*improved with, for example, a walking path on the bank of the river.”* Traditionally treeless mires are not seen as tourist favourite places but there were also comments about them: *“It is great to observe the bustle of life (downhill skiers) on the Levi slopes from the treeless mire.”* In addition to natural sites, there were some favourite spots with cultural values like: *“Kirkkokuusikko: the first church of Lapland.”* *“Close by our holiday cottage a jogging track and forest.”*

## 6.2 Suggestions for improvements

Approximately one fourth of the respondents (53 people, 23 %) gave suggestions for improvements. There were 86 suggestions focused on 61 different sites (Fig. 3). Suggestions were focused more on Levi’s surroundings (n=60) than on Levi centre (n=26), the fell Käkätunturi being the most mentioned hot spot area. Mostly the suggestions concerned improving waymarking (n=24) in the fells Käkätunturi and Levi-tunturi. The hopes for managing the environment (n=18) consisted of mainly repairing erosion caused by trampling. Additionally, some places were perceived as needing vegetation management or replanting. The suggestions for additional trail facilities and services (n=18) were mainly in constructed areas like close to Levi centre. Suggestions to improve accessibility (n=17) were marked all over the survey area. Another important issue to notice is that there were somewhat more places where the respondents did not want any changes (n=63). A majority of the sites were located at the summit of Levitunturi and in the vicinity of the fell Käkätunturi.



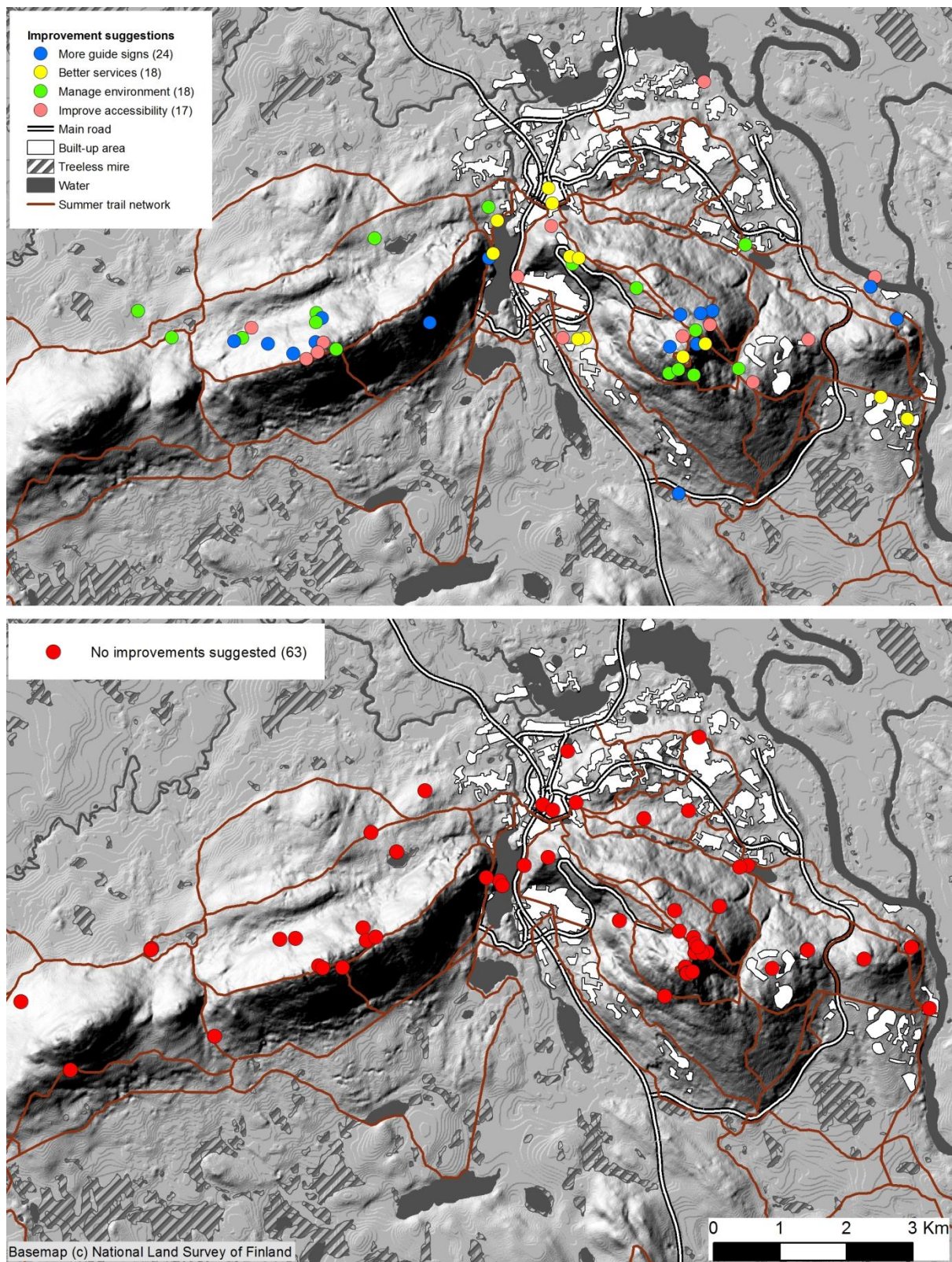


Figure 3. Suggestions for improvements and suggestions that the places should remain as they are



### 6.3 Feedback on the PPGIS method and the enquiry

Almost all respondents (98 %) provided background information at the beginning of the questionnaire (Table 2). Less than half replied to the third and fourth themes consisting of map questions about favourite places in the Levi surroundings (37 %) and in Levi centre (40 %). Far fewer people (13 %) drew her/his main route in the area during summer and autumn time. Only four persons (2 %) suggested new trails. Over half of respondents (60 %) answered the questions about services.

A majority of respondents (79%) who interrupted the questionnaire (Group B) answered the first set of questions concerning their background (Table 2). After that the commitment to answer the questions declined even faster compared to Group A. One fourth of the people (26 %) marked their favourite places in Levi's surroundings, only ten (4 %) in Levi centre. No responses were received on trails but five people (3%) answered the last questions concerning the services.

Table 2. The number of responded people per theme in groups A and B (M = Map question)

	Group A		Group B	
	n (people)	%	n (people)	%
Background	230	98	117	79
Levi surroundings (M)	88	37	60	26
Levi centre (M)	93	40	10	4
Existing route (M)	32	13	-	-
New route (M)	4	2	-	-
Services	141	60	5	3

Approximately a third (33 %) of respondents gave feedback about the map questions. The number of answers to each question varied somewhat (Table 3). There was a question to measure how map parts worked in the questionnaire (Figure 4). The higher the median was, the fewer problems occurred. A value of 50 means that answering had not been especially easy or difficult. In proportion, the smaller the median was, the more problems occurred. Mostly people had major challenges when marking the places or trails on the maps. Over half of the respondents had found other tasks quite easy. The web connection was found to be well-functioning.

Table 3. Feedback about the map questions

	Loading the maps	Zooming in on the maps	Moving the maps	Localizing places on the map	Marking the places or trails on the maps	Web connection problems
N	85	78	80	77	75	73
Median	70.0	67.0	68.5	62.0	39.0	95.0

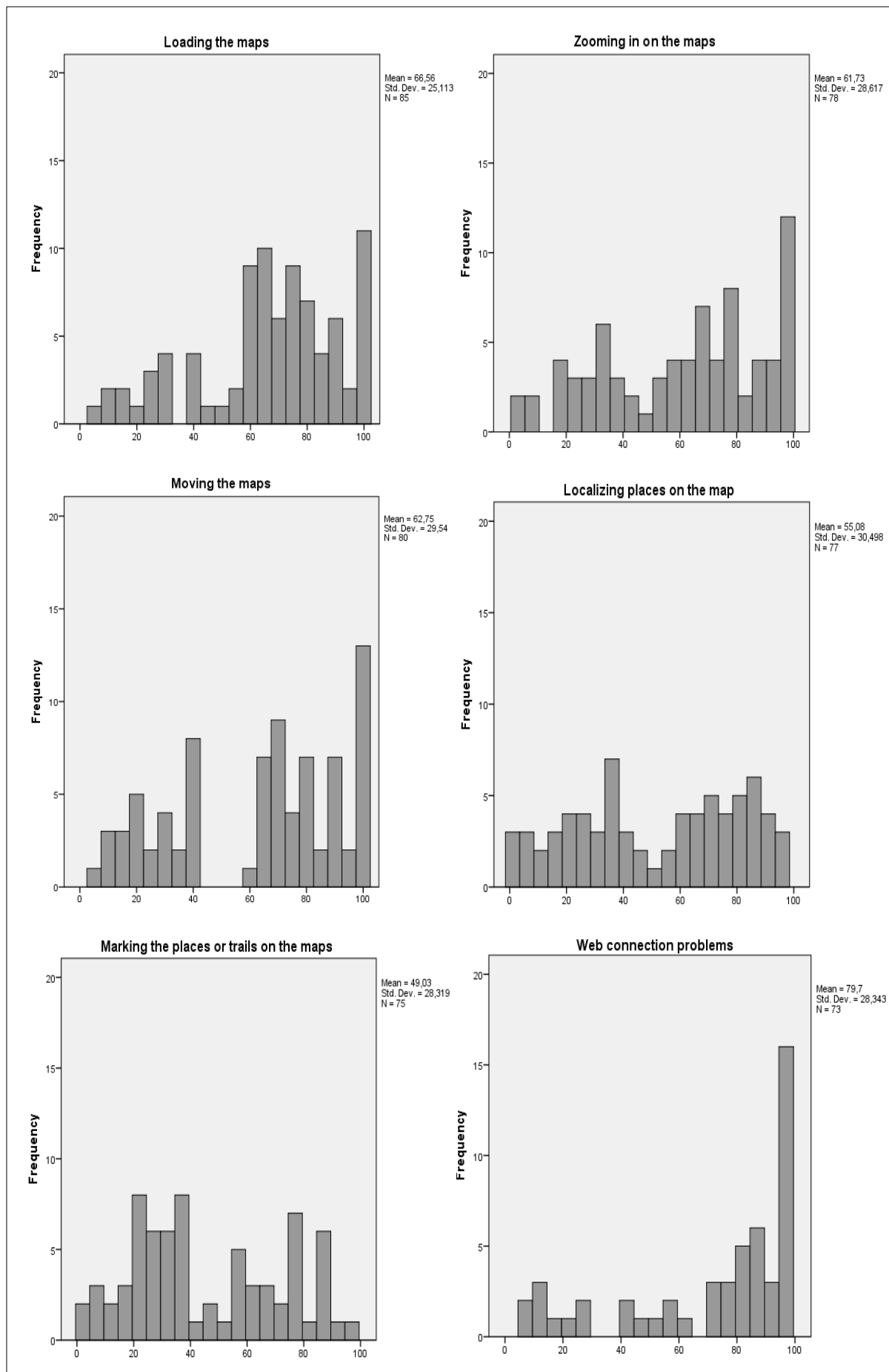


Figure 4. Functionality of map questions

Negative comments in response to the open question about the encountered challenges were given by almost half of the respondents (49 %) who made the map marks (n=105). Mostly the comments concerned the bad functionality or difficult use of the enquiry (n=34) and difficulties answering with mobile phones (n=18). Only two people complained about map reading problems.

## 7. Discussion

### 7.1 Success in reflecting users' favourite places

The PPGIS method succeeded quite well in finding users' most favourite place in the Levi tourism resort where views, hiking possibilities, wilderness landscapes and good services are appreciated. These qualities were reflected by a strong emphasis on three main hot spot areas. Hence, the PPGIS was able to generalize the previous knowledge on the popularity of the summits of the fells Levitunturi and Kätkätunturi with their natural landscapes. This was also acknowledged by a smaller amount of tourists who were interviewed earlier (Uusitalo, Sarala & Tuulentie 2006). The rather compact Levi centre and the nearby nature, which formed the third hot spot, revealed that services are an important part of tourists' wellbeing among nature-oriented tourism as well.

The hot spots were mainly located close to main paths. Consequently, the hot spots of favourite places are strongly directed by a trail network, which defines the accessibility of sites at a resort. The PPGIS method availed the comparison of the hot spots with the single places. The revelation of these less-used places is valuable. They indicated that there are sites close to water and treeless mires that have the potential to enhance users' wellbeing, but are more or less out of the reach of the trail network. The rarity of such landscape types has been noted also in the previous study, which analysed the distribution of different landscape types around the trail network of Levi (Uusitalo, Huhta & Nivala 2015). In addition, the findings were in line with the previous interviews, which however focused on winter and autumn visitors (Uusitalo, Sarala & Tuulentie 2006).

Just a few favourite places were marked near the river Ounasjoki, which appeared as an isolated landscape element of the resort. An explanation may be the difficulties to reach it: there are no bridges over the river Ounasjoki close by the resort. During winter it is possible to cross the river in several places due to ice cover, but in summer it is necessary to have either a boat or canoe for crossing. Moreover, there is no accessible beach near the river for tourists to use during summer, since the waterfronts are privately owned land. Keeping the eastern side of the river Ounasjoki out of the reach of tourists could be one way to maintain some recreational areas for local residents only.

The respondents' suggestions for improvements concerned mainly the fell Kätkätunturi. The suggestions were not, however, radical, but most typically concerned adding guiding signs.

These suggestions are worth taking into account in visitor management, since they guide the users to stay on paths. Trampling erosion can be better avoided as a result. Levitunturi has been experiencing accelerating tourism infrastructure development (Uusitalo & Sarala 2015). Many respondents did not wish for any more changes to their favourite palaces on the fell. Hence, the suggestions concerning the fell Levitunturi are more challenging and may require reconsideration of the resort's growth strategy.

## 7.2 Success involving users in tourism development

Some Facebook pages (i.e. the Levi Outdoor Festival Facebook page), where the enquiry was advertised, have more than 6000 followers. Hence, social media was expected to be a practical, easy and cheap way to advertise the enquiry. Some earlier PPGIS and tourism studies have collected the responses via email letters (e.g. Pocewicz's et al. 2012; Brown & Weber 2013) so the exact response rates were defined. This was not possible in this project due to the mode of performing the questionnaire on the internet. Compared with earlier tourism PPGIS studies (Pocewicz's et al. 2012; Brown & Weber 2013; Pietilä & Fagerholm 2016), the amount of respondents was however fairly high. It is noticeable that the announcements of the enquiry were meant to catch tourists who had been to Levi more than once.

The majority of the respondents were women, which is opposite to the findings by Hansen and Reinau (2006). The fact that the topic was framed by wellbeing might have interested more women than men. The findings point out a shortcoming of the method in relation to representativeness. The imbalance between genders was noticed during the middle of the enquiry period. Improvement of the representativeness of the data was attempted by encouraging male tourists to respond to the questionnaire. They were approached during the Levi marathon and tourism companies were asked to advertise the enquiry especially to male customers.

The findings further showed that people answered the map-based questions less eagerly compared with the questions that did not involve mapping. There was a large amount of people who gave negative feedback on the mapping tasks as well. Moreover, the amount of people (Group B) who discontinued the questionnaire was quite high. It seemed that the mapping tasks were perceived as difficult for personal or technical reasons, which are discussed more next.

As the electronic PPGIS system is a relevant new method, it may take time to adapt it to part of an official planning process (Brown 2012). Challenges of the system are related mainly to two parts. Firstly, the technical issues like coverage and functionality of internet-connection, the functionality of the PPGIS enquiry and the accuracy of the scale with which the responses have been acquired. Secondly, respondents' lacks of skills varied greatly: the lack of IT skills, map reading and cartographical skills and the lack of people with good GIS skills.

Then there are also challenges with participatory possibilities and willingness to participate, money resources and lastly generalizing data results (e.g. Ball 2002; Kangas & Store 2002; Wood 2005; Sieber 2006; Blomé 2013).

In this research, the problems concerned mainly about the functionality of the PPGIS questionnaire, which was caused mainly by malfunctioning software. The findings also suggested lack of IT and map-reading skills by respondents. They were implied by the fact that marking the places and trails on the map were considered as the biggest challenge by the respondents. Together with the lack of map-reading skills it was challenging to localize places on the map. It is possible that the method was just new, but many of these difficulties could just as well have been due to the shortcomings of the software. Since the respondents had difficulties already in clicking points on the digital maps, it is not surprising that they seemed to have even more difficulties clicking the lines of the existing trails or drawing new ones. Furthermore, a lot of responses were lost due to software problems.

The enquiry and the software were tested beforehand by many users in different browsers. The enquiry was supposed to work on a tablet but not on a mobile phone. According to the complaints, it did not work on the tablet either. It was a mistake to put a QR-code on the leaflets and posters about the questionnaire, even though the limitation of the QR-code functioning properly only on tablets was mentioned there. Many did not seem to notice this information and at the end the QR-code encouraged people to respond to the questionnaire with their mobile phones. Instead, only a few mentioned problems with the slow internet connection and loading the maps.

Hansen and Reinau (2006) remarked about the challenges and suggested that PPGIS enquiry makers should not be too fascinated with the new technology and its details, but rely more on real face-to-face discussions. This is important, especially when people do not have good map reading skills or experience with the electronic map software.

The high number of respondents who discontinued the questionnaire may indicate that the visitors lacked local knowledge. It is likely that they seldom visit the resort or had only visited for the first time. This assumption was supported by the fact that two thirds of the respondents who sent their answers had visited the resort several times or regularly. Many probably felt that they did not know the area well enough for marking their favourite places. 'Favourite place' in Finnish (*mielipaikka*) has a strong meaning which refers to a site or area that is very important to a person and he/she has good memories of the place and knows it well. The true meaning of the word, however, refers more specifically to personal wellbeing rather than simply the often-used attribute 'beautiful place'.

Alternatively, the tourists did not see the subject as important and motivating as it would have been if focusing on the respondent's ordinary living environment. Because many tourists are tuned for comfort and relaxation during their stay, they easily give up doing things that they find difficult, time-consuming or irrelevant to themselves. If respondents are asked issues that they find important (like the NIMBY phenomenon), then they are probably ready to use more

time for responding and to be less affected by technical challenges in answering. It is also possible that the enquiry was too long and their motivation had left before the end.

## 8. Conclusion

Through the hot spots of favourite places, the PPGIS indicated that visitors of a nature-based tourism resort can be quite unanimous in their preferences. The hot spots support the previous findings suggesting that natural sites are the key assets in a nature-based tourism resort. In addition, the method revealed interesting single points detached from the hot spots. Their existence revealed that peoples' needs may differ. The single points mainly located close to water further showed that the present trail network does not necessarily reach all types of natural areas. For example, the river Ounasjoki is situated nearby the Levi city centre but there are no bridges. It makes the eastern side of the river inaccessible. These kinds of comments give new insights into resort planning.

Instead of collecting tourists' general opinions about resort development, it is possible with PPGIS to pinpoint where the improvements are essential. The users' suggestions involved mainly adding guiding signs, improving accessibility and repairing areas damaged by trampling. They concentrated on the Kätkä fell, which is in a more natural state compared to the hot spot of the Levi fell. This knowledge underlines the importance of accessibility of natural sites and maintaining their natural and wilderness qualities.

In other words, knowledge about social values highlights how important closeness to nature is to tourists. It stresses well-marked paths, i.e. how to easily get to favourite places, as an important issue in the promotion of wellbeing. Only four recommendations for new routes were, however, made by the respondents. The finding implies that a sufficient amount of summer and autumn routes and tracks already exists at the Levi resort. Alternatively, the marking of new trails and marking the points were hindered by technical difficulties with the PPGIS internet application. The latter explanation was supported by the respondents' feedback on the technical functionality of the software when making map marks.

Indeed, usability of PPGIS enquiry needs to be watertight and easy in order to make full use of the properties of the method in resort planning. When meeting technical challenges, people and especially tourists who are enjoying their holidays may easily lose interest in expressing opinions. Moreover, representativeness of respondents needs to be considered. This can be improved through well-planned promotion. Social media (especially Facebook) was found to be an effective way to promote the enquiry. Second, the digital questionnaires could be supplemented with a printed version for the sake of tourists, such as elderly people, who may not be routinized users of IT applications. We further recommend comparing different software solutions, since their purposes and technologies may vary, and control the length of enquiry. One needs to remember that map tasks are quite time-consuming. Based on this study case, an enquiry that takes 15–20 minutes to answer seems too laborious.

Even though there were many technical problems in the software, a lot of valuable data, representing different views of tourists, was received. The social data can be further joined



with ecological data in order to locate the places where ecological and social values meet. The information helps local entrepreneurs find the environments where nature and wellbeing experiences are most likely to occur and to guide their clients there. Moreover, public authorities can use the information in master and site planning of the resort when targeting year-round and wellbeing tourism.

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