

## Chapter 6

### PPGIS for a better understanding of people's values – experiences from Finland and the Faroe Islands

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#### Introduction

People's experiences and knowledge of their living environments are an essential core source of information for decision-making regarding land use and natural resources. European Union (EU) directives require citizens to be involved in land use planning and, in many countries, legislation states the need for such involvement. In Finland, for example, the Land Use and Building Act (1999) Section 1 states: 'The Act also aims to ensure that everyone has the right to participate in the preparation process, and that planning is high quality and interactive, that expertise is comprehensive and that there is open provision of information on matters being processed'. Indeed what we now see is that the traditional implementation of "top-down" planning has shifted more towards bottom-up planning, where initiatives come from citizens as well as from planning authorities (Sieber, 2006).

In recent decades, the range of ways to involve citizens in planning has increased from hearing people *in situ* and giving them the possibility to make notes on preliminary plans, to acquiring the views of citizens in the early stages of planning. Even more so, the development of tools such as internet-based participatory mapping methods enables the collection of localised information from stakeholders regardless of their physical presence in a certain place at a certain time (Brown & Kyttä, 2014). While there are several terms for participatory mapping methods with slightly different connotations, for example, participation GIS (PGIS), public participation GIS (PPGIS), volunteered geographic information (VGI, VGIS) and collaborative mapping (Brown et al., 2014; Verplanke et al., 2016) in general, map-based tools enable the collection of root-level information about citizens' cultural and social views of their environments and important places, and its incorporation into decision-making (Sieber, 2006; Connors et al., 2012). The use of PPGIS for example, usually refers to queries made by public bodies to obtain information about the statutory planning process, whereas PGIS has been seen more as a community-level process

to encourage citizens to build social capital and empower them through the collection of information about their environment (Brown & Kyttä, 2014; Verplanke et al., 2016). (A more thorough analysis of the terms PPGIS and PGIS and participation can be found in Chapter 5.)

At the core of this chapter is a study of the usability and development needs of PPGIS on the basis of two case studies of participatory mapping queries that address different types of land use issues. In the first case study the building and implementation of transboundary PPGIS in three Nordic countries, Finland, Sweden and Norway, is demonstrated. Despite informal borders and continuous interaction between citizens from the countries in question, cultural differences exist between local inhabitants and visitors that are reflected in people's views of different land use modes. In the second case study, PPGIS is used in the context of land use planning to grow tourism in the Faroe Islands, where tourism infrastructure often conflicts with local land ownership and traditional land use. The final part of the chapter discusses the usability and development needs of PPGIS as extracted from the interviews conducted with public authorities and stakeholders.

### **Enontekiö-Reisa-Kiruna transboundary PPGIS survey**

As part of the BuSK project, a PPGIS survey extending to areas of three Nordic countries (Figure 6.1) was conducted. The aim here was to obtain the views of locals, including the indigenous Sami people, non-local Finns and Norwegians, on the different land use modes and the values they placed on different locations. The area covered was between N 67.92° to 70.05° and E 17.88° to 25.86° in Finland, Sweden and Norway. The area ranges from subarctic to arctic-alpine areas, with some small villages and population centres. Large wilderness areas and traditional land use and livelihoods such as reindeer herding and fishing characterise the area. Nature-based tourism and related activities have also been common for decades and are growing quickly. People can cross borders without travel documents, and lively transboundary trade and recreational use characterise the area.

The PPGIS survey was planned by the Finnish–Norwegian BuSK team, but comments on the questions were also obtained from local people and local authorities. In the survey, respondents were asked primarily to give their place of residence, occupation, education, age and sex as background information. Respondents could then mark on the map: (1) their important places, (2) places with conflicts and disturbances, and (3) stories and traditional

knowledge of places, while (4) reindeer herders could mark important places for reindeer herding. The values were partly adopted from earlier studies (Alessa et al., 2008) and modified to fit the area. Markings could be made as points, lines or polygons. Having made their markings, respondents were given a list of options (see Table 6.1) and a free text option to explain their markings in more detail. The survey was open between 20 February and 31 August 2018, and it was available in Finnish, Norwegian, Swedish and Northern Sami.

Value	Place of residence							
	Local		Other Finland		Norway		Total	
	Markings	%	Markings	%	Markings	%	Markings	%
Recreation	134	12.1	62	12.2	43	21.7	239	13.2
Beautiful scenery	136	12.3	71	14.0	22	11.1	229	12.6
Silence	86	7.8	56	11.0	11	5.6	153	8.4
Special nature value	86	7.8	47	9.2	9	4.5	142	7.8
Health and well-being	75	6.8	26	5.1	24	12.1	125	6.9
Place has its own value	67	6.0	40	7.8	12	6.1	119	6.6
Biodiversity	79	7.1	32	6.3	4	2.0	115	6.3
Importance for future generations	57	5.1	36	7.1	12	6.1	105	5.8
Clean water	61	5.5	33	6.5	4	2.0	98	5.4
Hunting, fishing, gathering area	62	5.6	15	2.9	17	8.6	94	5.2
Cultural heritage	65	5.9	17	3.3	11	5.6	93	5.1
Place to show	55	5.0	17	3.3	8	4.0	80	4.4

visitors/tourists								
Historical place	44	4.0	15	2.9	7	3.5	66	3.6
Meeting place	33	3.0	7	1.4	10	5.0	50	2.8
Learning opportunity	34	3.1	10	2.0	2	1.0	46	2.5
Sacred/religious place	4	0.4	14	2.8	1	0.5	19	1.0
Reindeer pasture	9	0.8	4	0.8	0	0.0	13	0.7
Reindeer herding structure	9	0.8	2	0.4	0	0.0	11	0.6
Other	11	1.0	4	0.8	1	0.5	16	0.9
<b>TOTAL</b>	<b>1,107</b>	<b>100.0</b>	<b>508</b>	<b>100.0</b>	<b>198</b>	<b>100.0</b>	<b>1,813</b>	<b>100.0</b>

Table 6.1 The sum and percentages of markings describing the important places within the transboundary PPGIS study area made by Enontekiö's local residents and visitors from elsewhere in Finland and Norway

The compilation of surveys using modern PPGIS applications (Rzeszewski & Kotus, 2019) is a relatively straightforward task. Testing functionality with people who had no previous experience of PPGIS surveys emerged as an important part of the PPGIS survey design, and several modifications concerning substance, terms, the order of questions and instructions for respondents were made during this phase. Originally, vector-based maps from three countries, with different projections and symbols, were converted to raster maps which were projected onto the most central projection and merged. The resulting maps allowed respondents to localise places using a scale of 1:25,000 and base map symbology. The survey was promoted in several social media discussion platforms, including local municipality and village bulletin boards, national hikers' groups, and local groups for hikers and nature lovers based in the study area. The number of followers and members in these

groups ranged from a few hundred to about 50,000. The survey was also advertised in a local newspaper with a circulation of about 2,800 hard copies as well as being accessible on the internet. The survey yielded 658 PPGIS response sessions and the respondents marked a total of 1,813 values on the map describing the places they used. The sum of map markings was highest for the north-western part of the municipality of Enontekiö, including the environs of Kilpisjärvi village and Saana fell, Hetta village, and the northern border region between Finland and Norway (see Figure 6.1). Values related to recreation, beautiful scenery, silence, special nature value, health and well-being, and “place has its own value” were rated highest (Table 6.1).

Locals and other Finnish respondents ordered these values similarly, but Norwegians valued recreational values and health and well-being more highly. Locals valued biodiversity more highly than other Finns, while Norwegians valued it as the sixth lowest. Interestingly, the importance of a place for future generations was valued more highly by other Finns (the sixth highest) and Norwegians (fifth) than locals (eleventh). This may reflect the fact that large numbers of tourists have visited the place regularly for many decades and thus have a close relationship with it.

Local residents and other Finns marked recreation, beautiful scenery, silence and special nature value among the four highest values, while Norwegians marked notably fewer places with the two latter values (see Table 6.1). Indeed our study showed that these values may conflict with other land use modes as for example, the location of places where respondents rated the value “silence” highly coincided with places important for snowmobile use (Figure 6.1). A classic demonstration of how PPGIS can be used to identify the spatial dimensions of conflicting values (see also Brown et al. 2017; Karimi & Brown, 2017).

It is also worth noting that reindeer herding places were underrepresented in the data. Reindeer herding is an important traditional Sami livelihood. There are 365 reindeer herders in Enontekiö (Reindeer Herders’ Association, 2018), constituting about 19 per cent of the municipality’s population, with 2.5 per cent of respondents marking “reindeer herder” as their occupation.

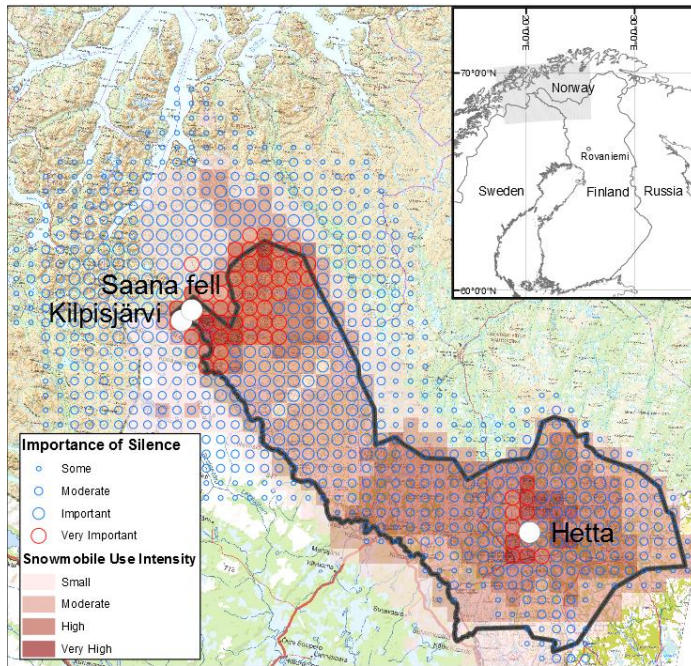


Figure 6.1. The transboundary PPGIS study area. The number of important places of silence and snowmobile use intensity was calculated using  $5 \times 5$  km grid cells. The number of silent places is indicated by gradually increasing circles; the intensity of snow mobile use with graduated red. The dark line delineates the municipality of Enontekiö. The grey area in the inset shows the study area and point the location of the city of Rovaniemi.

At best, PPGIS mapping can capture local knowledge, identify sensitive issues and locations, increase the exchange of information, opinions and perspectives, reveal the spatial dimensions of potentially conflict-causing issues and democratise the planning process (Brown et al., 2017; Karimi & Brown, 2017; Kivinen et al., 2018). Place-based knowledge can significantly contribute to an understanding of how people perceive and experience the landscape, how they use their local environment and how they value it (e.g. Kivinen et al., 2018). As our results show, PPGIS can also reveal differences among respondents with different cultural backgrounds.

However, one should ask whose reality, categories, perceptions, truth and logic are expressed by the markings on the maps (Rambaldi et al., 2006). In our case, it is evident that different land users, especially reindeer herders, are not sufficiently represented in the map responses. Furthermore, according to feedback about the survey from some local residents and Sami representatives, information about gathering, hunting and fishing places was undisclosed and

shared only with community members. The hunting, fishing and gathering sites marked on the maps therefore probably represent a small fraction of those in this category. Similarly, information about sacred sites is considered secret and sensitive (see Chapter 3). According to traditional records, there are several sacred sites in the Finnish side of the study area, but the exact locations of only a few are documented (Metsähallitus, 2017). The discussion of whether the locations of Sami sacred sites should be documented, and whether this information should be open access, is ongoing in Finland at large and more specifically among Sami communities in the Nordic countries.

A total of 208 important areas were delineated with polygons; 48 per cent were made by locals, 22 per cent by Norwegians and about the same number by other Finnish respondents. About 9 per cent of the individual areas delineated as important covered at least 50 per cent of the area of the Enontekiö municipality. Respectively, 10 per cent of important areas covered one-third, and 30 per cent at least one-tenth of the area. The entire area belongs to the Sami home region, and reindeer herding extends over it all, with some special areas for calving, summer and winter pastures and reindeer round-ups. Important fishing and hunting places can also be found throughout the area. Marking the whole area as a place of special importance is probably therefore explained by the way local people see the area in their everyday activities. It is known that people are reluctant to reveal places they regard as belonging to them because of the traditional idea of land ownership. Marking the whole area as an important place may also be an indication of “counter-mapping” (Peluso, 1995), a process in which locals express their claims to territories by marking areas of traditional land use on maps. Counter-mapping may also be a protest against technological ways (PPGIS) of presenting local or traditional information, in which the values of places belong to larger entities and landscapes which cannot be divided into single locations. However, there were no differences among locals and other respondent groups concerning the size of areas, which implies that if some markings were counter-mappings, they were made by all respondent groups equally.

### **Inclusive and participatory tourism planning – a case study from Sandoy, the Faroe Islands**

In the Faroe Islands or Faroes, growing tourism has recently led to discord and conflict with other forms of land use, particularly sheep rearing. The tourism branding of the Faroes

largely focuses on “wild” nature experiences, which means that the outfields are attracting a growing number of tourists. In reality, outfields are a somewhat cultured landscape, used mainly for sheep rearing but also for other land uses. This is the case on the island of Sandoy for example, which has been harvested relatively sustainably for centuries. Local land use practices are rooted in long traditions of local knowledge. Sandoy comprises an area of 112.1 square kilometres and has approximately 1,240 inhabitants living in six villages divided into four municipalities. The outfields, or grazing areas, which are used mainly for sheep, are divided into numerous parts, often with multiple owners. Traditional land use and resource management is complex and based on both formal and informal principles, institutions and legislation. In contrast with the other Nordic countries, the principle of the freedom to roam or the “everyman’s right” does not apply in the Faroes, and landowners play a stronger role in controlling access to the land.

It was clear from the interviews conducted by the Faroese BuSK research team with local and national planning authorities, as well as with other stakeholders, that formal planning procedures in the Faroes were characterized by a top-down approach. Moreover there was little focus on formal procedures to secure local participation in planning with little evidence of attempts to include local knowledge. Local actors and stakeholders could only complain or make their remarks on an overall plan and/or local plan under preparation through a consultation period. The consultation period does not open up a genuine mutual dialogue, nor does it use local knowledge as a basis for future land use planning (Hovgaard & Bogadóttir, 2018). What this suggests is that there is clearly a need for participatory and inclusive planning, and adequate planning tools to anticipate and accommodate conflicting interests.

PPGIS was used in the Faroes to collect knowledge and information about local people’s land use practices and local perceptions of landscape value on the island of Sandoy. The purpose of the survey was to create a holistic cartography of the Sandoy landscape through participatory mapping. Another principal aim was to enhance the understanding of the usefulness of participatory GIS tools in collecting and including local perspectives in resource management and land use planning in general, and specifically in tourism planning. The survey questions were informed by comments and information from previous interviews conducted with planning authorities and local stakeholders. The survey was targeted at all the inhabitants on the island of Sandoy, as well as the smaller outer island of Skúvoy, which is part of the Sandoy district. Respondents were asked to mark on the map: (1) places which



they used for provisioning, such as sheep herding, cropping, hunting, fishing, gathering and so on, (2) places with special cultural, personal, historical or natural importance or significance, and (3) places of discord or conflict over land use.

A total of 194 people responded to the survey, of which 103 were men and 91 were women. Of a total of 777 markings, 60.7 per cent were made in places of special significance to people, 28.2 per cent in place providing provisioning services and 11.1 per cent in places where there were land use conflicts. Figure 6.2 illustrates how markings of places of special importance and places with provisioning services were distributed in the landscape, with most markings clustered around the settlements. It is noteworthy that most markings were related to cultural ecosystem services, which can be defined as non-material benefits that people obtain from ecosystems (Milcu et al. 2013; CAFF, 2015). Although these dimensions are crucial to local well-being, they are often not included in resource management and land use planning. However, the participatory cartography produced by the PPGIS respondents clearly highlighted exactly these landscape values. Of the 86 markings of land use conflicts, 18 (20.9 per cent) were reported as directly related to tourism.

The PPGIS survey targeted all the inhabitants of the Sandoy district, but was open to everyone. It was promoted mainly through local tourism social media platforms, the municipal authorities and the news media. In addition, local land owners were specifically targeted, receiving an email with a URL link to the survey. It was noticeable that the response rate was much higher immediately after the survey had been promoted. It was also clear that certain citizen cohorts were not well represented in the survey. For instance, no one under the age of eighteen responded, even though this age group is generally considered to have technological skills and good access to digital platforms such as PPGIS. Had this group been directly targeted in the promotion of the survey, for instance through cooperation with local schools, the results may have been different; a situation that underlines the importance and necessity of recognising the inherent biases of PPGIS surveys (Brown, 2017). Despite this however, the high response rate indicated the positive potential of participatory GIS in locally inclusive planning. Another main lesson from the PPGIS survey was that on-site engagement with local actors and the use of local networks for promotion was crucial for attaining responses.

In addition to the PPGIS survey, a stakeholder meeting was organised with local landowners to discuss problems and potential problems with tourism and other forms of land use. Printed maps were used to identify potential areas for tourism operations, guided tours and so on, as well as areas where tourism and hiking should be avoided. Local stakeholders and planning authorities generally expressed interest in using GIS in local planning, particularly in promoting local interests and perspectives on national authorities. At the same time, there was also hesitation, stemming from a general distrust in the prospect of achieving actual local empowerment.

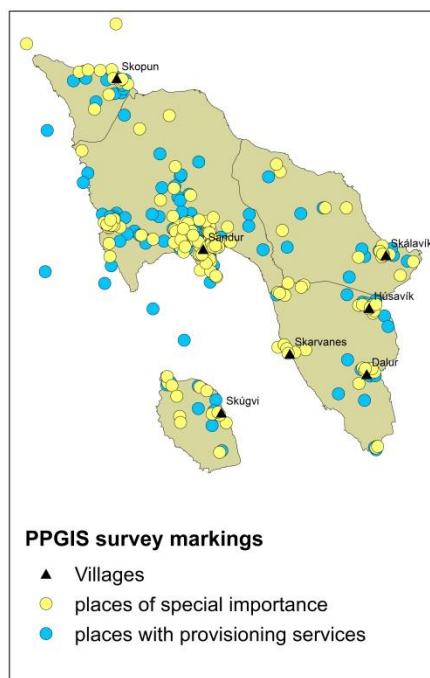


Figure 6.2 Distribution of PPGIS responses marking places of special importance and provisioning services in Sandoy district

### **Authorities' and stakeholders' views of participatory mapping**

In a further part of this research, interviews with authorities and stakeholders were conducted in Rovaniemi, Finland during 2017 to identify the advantages and challenges of using a PPGIS methodology. The city of Rovaniemi has about 60,000 inhabitants, and most of its area is rural with a scattering of small villages. A total of twenty-seven people were interviewed either in individual or pair interviews. The interview questions focused on the current state of land use planning and decision-making, the challenges and successes associated with such planning and the present and potential future use of PPGIS. Respondents

included eleven women and sixteen men, nine of whom were local officials of the city of Rovaniemi, three were local policymakers and fifteen were stakeholder representatives (e.g. tourism entrepreneurs, reindeer herders, inhabitants and forestry professionals). In four cases, the stakeholder representative was also a local politician, which was an important additional element in the interviews in that attitudes of the authorities and politicians have been found to hinder the adaptation of new technologies in previous studies (Brown, 2012; Brown & Kytta, 2014).

All interviewees were familiar with reading and expressing their views on maps. PPGIS was familiar to twelve interviewees either through work or leisure. Seven interviewees, either themselves or through their organisation, had answered the map survey. Two respondents had never seen any type of map-based survey. Almost all interviewees (22) considered the PPGIS-method potentially beneficial. Two interviewees were not interested in utilising the method in the future because they considered the mapping tool a threat to the organisation's established operation. In this case, there was a perception that the use of different participation methods would only slow down land use planning processes. As in previous studies (Kingston, 2011; Brown, 2012), the respondents emphasised that it was important to consider the PPGIS method as one participation method among many, and this alone does not solve all participation-related problems. The interviewees emphasised the importance of short and easy-to-use surveys, the reliability of the technique and structured surveys. The importance of an open-ended answer format was also emphasised and suggestions of face-to-face discussions and traditional paper maps were thought necessary in some cases. The visual way of presenting information, concretising of matters, and the possibility of localising information were seen as advantages of PPGIS. Localised places on the map were believed to increase the reliability of information, as found in several other studies (Hanzl, 2007; Kahila & Kytta, 2009; Brown, 2012). However, spatially inaccurate markings were also mentioned.

While it was felt that mapping surveys reach a larger audience than traditional methods, respondents stressed the importance of advertising a PPGIS survey through different channels when the survey has started. The interviewees mentioned that one challenge of the PPGIS method was that it could highlight the representativeness of certain stakeholders, an issue also raised in previous studies (Hansen & Reinau, 2006). The risks of intentional abuse, such as answering a survey several times, were also mentioned. An interesting detail was that information which had been presented anonymously and electronically was seen as more

inappropriate or unreliable than information obtained using other participatory methods. Overall, the answers emphasised the importance of unbiased representativeness and the accuracy of answers (Ball, 2002; Sieber, 2006).

Local knowledge is frequently gathered in Rovaniemi, in some cases using PPGIS, but it is unclear how the information influences decision-making. People's opinions are collected and recorded, but as in earlier studies (Sipilä & Tyrväinen, 2005; Fung, 2015), the real significance and incorporation of such public input in decision-making remains questionable. One suggestion gleaned from the interviews was the need for a written summary of public input accompanied by a description of how such input influenced planning decision-making. A real-time and interactive map application, which would allow the different parties to discuss and communicate about particular planning options, was also seen as another possibility (see e.g. MyHelsinki).

## **Discussion**

It is quite a common outcome from participatory processes that stakeholders feel they have no real influence on the process and the outputs of final plans (Sipilä & Tyrväinen, 2005; Reed, 2008; Fung, 2015). Mere planning tools like PPGIS cannot replace a proper planning of the participation process or other participatory methods (Kingston, 2011; Brown, 2012). The steps for a proper planning process require that stakeholders are involved at an early stage of the process, the objectives of planning are clarified, the adoption of a philosophy in institutions that builds on stakeholder's empowerment, equal opportunities to participate, and trust among participants and authorities (Reed, 2008). The process should also be meaningful for both the participants and authorities in terms of improved operational knowledge of the area, and emphasise knowledge building instead of methodological issues (Faehnle & Tyrväinen, 2013). In cases like our Transboundary and Faroe PPGIS surveys the co-production of knowledge and co-management of land and natural resources call for special attention to traditional and cultural ways of perceiving and understanding the environment (Sieber, 2006). A critical issue may be the representation of knowledge, that is, how intangible values can be converted and presented in the PPGIS environment.

The long-term commitment of institutions and stakeholders is required to build a process where different ways of producing and using knowledge in decision-making are utilised

(Armitage et al. 2011). In particular, the commitment of administrative and political institutions to a participatory process is of key importance. In our interviews, some authorities regarded participatory mapping as an extra effort on top of the more traditional ways of involving people. However, in the toolbox of participatory methods, both authorities and stakeholders mostly saw PPGIS as a potential tool for building a shared knowledge base of localised information. The reluctance to introduce new technologies like PPGIS to planning may reflect the fact that either the method is unfamiliar to the participants or they fail to see the additional benefits of participatory mapping for the planning process. As Pietilä and Fagerholm (2018) found, the authorities regard PPGIS as useful if surveys are practical and clearly connected to the planning process. Similarly, the willingness of stakeholders to respond to PPGIS depends on the objectives of the participatory process, which must also be in the interests of stakeholder groups (Reed, 2008).

The number of respondents in both PPGIS surveys was relatively high, but a careful definition of stakeholder groups in the planning phase was equally apparent as some potential respondent groups were underrepresented in both surveys. Respondents in the Faroes were actively involved in the PPGIS survey process, and many respondents had a direct interest in the use of outfields, which probably increased the number of responses. Although some stakeholder groups (reindeer herders, locals, Sami, Finnish and Norwegian tourists) were defined in advance in the transboundary PPGIS, the survey was not actively targeted at any of the groups. In addition, there was no clear planning objective in the survey, which may have reduced the interest of some groups in responding. In both cases, the number of respondents peaked immediately after announcements of the survey were released in social and print media but decreased within a few days. These experiences underline the role played by social media as an integral part of PPGIS surveys (Kantola et al., 2018), as it enables contact with a large number of potential respondents and repeating the promotion of the survey is relatively easy and cost-effective. However, it should be kept in mind that the use of social media does not necessarily mean the same as probability sampling, for example, random household sampling, and it can also lead to biased outcomes with regard to minority perspectives or the overall representativeness of the data (Brown & Kytä, 2014).

The emergence of web-based cartographic tools has lowered the threshold for the public to produce geographic data and present it in various ways (Goodchild, 2007). However, technical problems in the survey's human-computer interfaces and, for some people,

inadequate computer skills, restrict and slow down the use of online surveys (Anderson et al., 2009; Kantola et al., 2018). PPGIS data produced by non-experts has been discovered to be of fair spatial accuracy (Brown, 2012), but there are differences among respondent groups in their capabilities of using computerised mapping (Rzeszewski & Kotus, 2019). This may increase spatial error but also lead to a biased number of responses from respondent groups, depending on their technological skills. Mapping systems were also experienced as difficult to use during both our PPGIS surveys. In particular, many users tried to complete the survey on their mobile phones but failed to handle menus, move and scale maps, and mark places. At least two problems can be seen with this: (1) an insufficient scalability of the mapping system; and (2) technical problems when marking places, especially delineating areas with PPGIS (Kantola et al., 2018). In conclusion, there remains the need for a better human–computer interface which recognises the requirements of various respondent groups’ cultural backgrounds, the ability to use computers and the processes they are involved in planning.

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