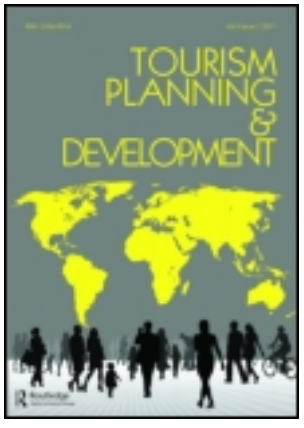

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Tourism and Power Plant Development: An Attempt to Solve Land Use Conflicts

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Tourism and Power Plant Development: An Attempt to Solve Land Use Conflicts

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ABSTRACT *Polar regions have many wilderness areas but the demand and competition for natural resources in those regions is increasing. Wilderness and natural areas are an important resource for the nature-based tourist industry as a stakeholder. The power production industry is another stakeholder interested in harnessing nature, and where the interests of these two stakeholders—nature-based tourism and power production development—meet, conflicts can arise. The main attraction of all tourism in Iceland is nature and wilderness, among them the Highlands. These same areas are also valuable for hydro-electric and geothermal power production. There are plans for further exploitation at many of the major rivers, as well as for a number of geothermal power plants in the Highlands. During the last decade a project ordered by the Icelandic government set up a plan to minimise environmental, social and economic cost due to power production. Four groups were asked to evaluate and rank 84 proposed power plant projects. One of them considered the impact of power plants on tourism and recreation. The methodology developed by that group is presented here, as well as its results. The methodology builds on system analyses and the Delphi method. The results show that many of the proposed plants are in the most valuable tourist regions. The results will form the basis of new legislation about land protection and power plant development.*

Introduction

Wilderness and natural areas are an important resource for the tourist industry. Countries where wild nature areas still exist can treat them as a capital asset and earn money by exporting the "wilderness experience" (Talbot, 1998; Nash, 2001). Consequently, economic reasons are now being used as a justification for conserving wilderness and natural areas and have even become a critical factor in their designation (Hall, 1992; Saarinen, 1998; Boyd and Butler, 2009; Fredman and Sandell, 2009; Hall and Frost, 2009; Hall *et al.*, 2009; Medina, 2009).

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However, wilderness management is complicated and often a forum for conflict. Approving and implementing management plans generates conflict among interest groups and between stakeholders and public managers. Political conflicts are very common among different social groups, conflicts about wilderness meanings, over land use and utilisation of natural resources. These originate in the spheres of economic interests, geographic differences, ethnic identities and scientific studies (Gladden, 2002). Williams (2002) states that conflicts can be expected where nature conservationists, tourists and local people are "offering multiple representation of a single place" (p. 123).

Tourism in Iceland has expanded rapidly in recent decades and the number of foreign visitors has grown annually by 7.2%, from about 72,000 in 1981 to about 556,000 in 2011 (Icelandic Tourist Board, 2012). In addition, about 90% of Icelanders travel domestically each year. Nature is the main reason that 88% of foreign visitors come to Iceland and 51% mention the Highlands—the uninhabited interior of the country, specifically as a reason for their visit. About 40% of all foreign summer visitors travel to the most popular tourist destination in the Highlands (Guðmundsson, 2010). This makes the Highlands very important for nature-based and wilderness tourism, but at the same time this very fast growth of tourism raises concerns regarding the difficulties of maintaining the qualities of the resource and the experiences of visitors.

The Highlands are also very valuable for electrical power production. Since the end of the 1960s some of the glacier-fed rivers in the Highlands have been dammed and hydropower plants built. Today, both tourism and power generation are very important for the Icelandic economy. The share of aluminium and other products of power-intensive industry has increased from 10% to 28% in 1990–2010. Proportionally, the tourist industry has been stable and provided between 12% and 13% of the total export during the last 15 years, except for 2009 and 2010 when it rose to 20% (Statistics Iceland, 2012a). There are plans for further exploitation at many of the major glacial rivers in the Highlands as well as for geothermal power plants at several of the biggest geothermal areas. Some of these sites are at important tourist destinations or potential destinations, places that have not yet been discovered by tourists or made accessible.

Power plant development reduces the main qualities of wilderness, primitiveness, naturalness and remoteness (Lesslie and Taylor, 1983; Hall, 1992; Hall and Page, 2006). Studies from Tasmania have shown that hydropower plants and their accompanying construction of dams and roads reduce wilderness values (Kirkpatrick, 1979; Hall, 1992). A study by Sæþórsdóttir (2010a) confirms that power plants have a negative effect on the wilderness experience of travellers in the Icelandic Highlands. It is important to realise that the effects of power plants reach much further than to the construction region of the power plant. New and improved roads are, for example, an unavoidable consequence of their construction. Thereby, as new areas are opened up, the number of visitors could rise, and the wilderness experience could change as the target group changes. Road construction and accessibility have a major effect on what kind of tourist destination develops, what kind of tourists visit the area, and to what extent the area is visited.

The Icelandic tourism industry has complained about being ignored when it comes to serious decisions regarding land use planning and utilisation of natural resources, and that its economic and social significance has been overlooked (Ministry of Industry, Energy and Tourism, 2008). As wild and untamed natural areas are an important resource for the tourism industry, their interests need to be taken into serious consideration when planning land use in the Highlands. If the aim is to build Iceland's economy based both on industries that require a large amount of electrical power and the nature-based tourism industry these conflicts have to be addressed and the location of new power plants needs to be carefully planned. The purpose of this paper is to present how land

use conflicts between tourism and power plant development have been approached for the Highlands of Iceland, both theoretically and practically.

Tourism in the Icelandic Highlands

The interior of Iceland, the Central Highlands, referred to here as the Highlands, covers about 40% of the country (Figure 1). The landscape is diverse and in many ways unique, characterised by wide open spaces with vast lava fields, sandy or stony deserts, large ice caps, geothermal areas and mountains of various types that stretch up to 2100 m above sea level. The area is largely desert-like, though occasional depressions and valleys have continuous vegetation (Thórhallsdóttir, 1997a). It is the roughest of all areas in Iceland, with volcanic eruptions, extreme weather conditions, and large rivers hindering travellers on their way. For more than 1,100 years the Icelandic Highlands were a "no-man's-land" and their usefulness was limited. Its legal status and ownership was not clear but that did not bother anyone as the area was mostly wasteland, usable only for summer pasture for sheep. In the last half of the twentieth century this changed and new technology made the area accessible and the nature in the Highlands became a potential resource. Since then the demand for its resources has increased greatly both for power production as well as for recreation and tourism, in addition to the traditional grazing.

For tourists the main attraction of the Icelandic Highlands is to experience unspoiled nature, beautiful and unique landscape, as well as freedom from the busy, hectic life, and it involves solitude, the pleasure of being alone, or in a company of few, in a challenging and vast setting with limited and primitive facilities (Sæþórsdóttir, 2010b).

The tourism practised in the Highlands is traditional sightseeing tours largely built on tourists gazing at the landscape and spectacular natural phenomena. Since the late

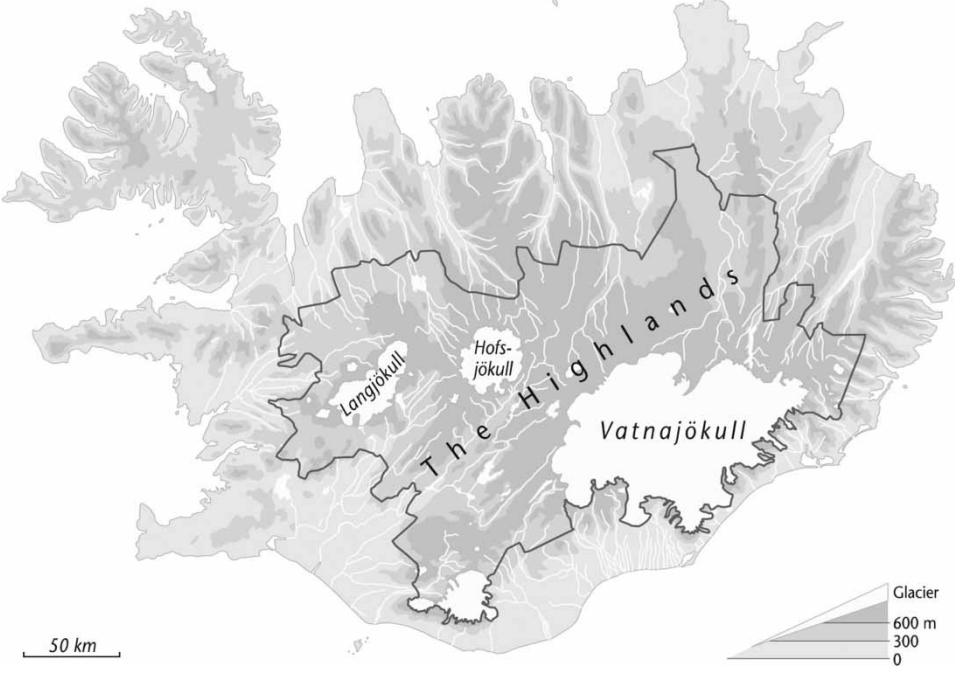

Figure 1. The Highlands. *Sources*: Anna Dóra Sæþórsdóttir (2011) and The Ministry of the Environment & The National Planning Agency (1999).

1990s new "soft" and "hard" adventure nature-based tourism activities have been developed. Riding tours through the Highlands, hiking, ice climbing, river rafting, biking, hunting and angling are all increasingly popular (Sæþórsdóttir, 2010b). Today all kinds of motorised vehicles are used in the Highlands: super four-wheel drive vehicles, motocross, ATVs, snowmobiles, and snow cats. These can all drive over difficult terrain—in snow and on the glaciers, and have even conquered the highest peak (Huijbens and Benediktsson, 2007).

No information exists on the total number of visitors in the Highlands. Roads have gradually become better, which makes day tripping into the area easier from the inhabited lowlands. According to Statistics Iceland (2012b) the number of overnights in the Highlands has gradually increased and almost doubled in the last 20 years, from a little less than 48,000 in 1985 to over 120,000 in 2009, but then down to less than 90,000 in 2010, the year of the volcanic eruption in Eyjafjallajökull. The proportion of overnights in the Highlands of all overnights in Iceland has decreased though, from 5.2% in 1998 to 3.0% in 2010 (Statistics Iceland, 2012b), which can partly be explained by the huge growth in foreign visits to the country overall.

The Effect of Power Plant Projects on Tourism

The Master Plan for Geothermal and Hydropower Development

Power plants require land, and in recent years land use conflicts have increasingly occurred between the interests of power production, nature conservation, tourism, and agriculture. Partly as a response to such, in 1998 the Icelandic government put forward an action plan for sustainable development where one of the goals was to make a long-term plan for the utilisation of natural energy resources (Ministry of the Environment, 1997). Part of that plan was a project led by the Ministry of Industry, Energy and Tourism in co-operation with the Ministry of the Environment called the Master Plan for Geothermal and Hydropower Development (*Rammaáætlun um nýtingu vatnsafls og jarðvarma*) where potential power plant projects were evaluated and ranked. The objective of the Master Plan project was to integrate utilisation and conservation policies and improve the planning process by identifying weaknesses and deficiencies in decision-making at an early stage in the planning process, which should lead to a greater consensus on the harnessing or protection of the natural resources of the country. All places where hydro and geothermal energy can be found in large enough volume for it to be economically exploitable were under investigation in the Master Plan. This includes all major rivers and geothermal areas, protected areas, and national parks. A total of 84 proposed power plant projects were evaluated. Of these, 44 are geothermal, 20 of them in the Highlands, and 40 hydropower, 24 of them in the Highlands (Sæþórsdóttir and Ólafsson, 2010a, 2010b). Thereby more than half of the proposed power plants are in the Highlands.

The Master Plan project was split into two phases: phase 1, which ran from 1999 to 2003, and phase 2, which ran from 2004 to 2010. The project was led by a steering committee, but most of the work was carried out by four groups of specialists. One of the groups consisted of nine experts and evaluated the effects of the power plants on tourism and recreation.

The overall timetable of the Master Plan determined the time available for resource and destination assessments and the selection of methodology. A relatively rapid resource assessment of a complex matter needed to be undertaken in a relatively short period of time in order to maximise the amount of information available to decision-makers. Under these circumstances a systems approach and the Delphi method came into good use.

The first step in the project was to divide the country into tourism regions, select attributes to evaluate, then evaluate the attributes, and finally re-evaluate the attributes as if the power station had already been built. Each step in the working process is described step by step in Sæþórsdóttir and Ólafsson (2010a, 2010b).

The work group in the Master Plan project had to make some fundamental assumptions when evaluating the effect of the proposed power plants (Sæþórsdóttir and Ólafsson, 2010b). The first was to focus on nature-based tourism when developing the methods and during the evaluation. The argument for this is that Iceland's main tourist attraction is nature, and the majority of the proposed power plant projects are in regions of great natural significance, half of them in the Highlands. Visitors to the Highlands consider unspoilt wilderness to be the most important component of their experience, and are very sensitive to any the wilderness and intact nature are most sensitive to construction (Sæþórsdóttir, 2010b). The work group also decided to evaluate the impact of the power plants according to how the plants would affect the current market segment in each region, that is, it assumed that future use would be similar to current use. The reason was that although some broad indications regarding the importance of nature and the wilderness for the tourism industry are known, the tourism industry has so far no plans or wishes regarding land use, and no decisions have been made regarding the target groups it wants to attract to various areas. The evaluation should have been based on that type of information, but as it did not exist, thus this assumption was made. The method was aimed at making it easier to see the spatial distribution and significance of tourism resources, to look at the big picture and set goals for the utilisation of natural resources before projects got too far into the preparation stage.

Systems Approach for Tourist Destinations

Systematic evaluation and planning of tourism development is complex and difficult, especially when it has to be combined with the interests of different sectors, and meanings, attitudes and values related to wilderness (Dawson *et al.*, 2007; Holden, 2008). In attempts to explain the development of tourist destinations, a number of theories and models have been made (Butler, 1980, 2006; Haywood, 1986; Agarwal, 1997, 1999, 2002; Faulkner and Russell, 1997, 2001; Russell and Faulkner, 1999, 2004; Saarinen, 2004; Hernandez and Leon, 2007). They have all been criticised for diverse reasons, such as for being only hypothetical, for being difficult to apply, and for not being useful to predict the future (see overview in McLennan *et al.*, 2010). It is therefore fair to say that there is a lack of development models that can be used for different situations and types of destination (Butler, 2009; McLennan, *et al.*, 2010).

A systems approach is commonly used as a means of understanding tourism and its integrated elements (Mill and Morrison, 1985; Leiper, 1990; Hall, 2005, 2008; Hall and Page, 2006; Dawson, *et al.*, 2007; McLennan, *et al.*, 2010). Scholars began applying general systems theory to tourism in the 1970s, resulting in a number of systems theories of tourism (Mill and Morrison, 1985; Getz, 1986; Gunn, 1988). Systems theory distinguishes between "open" and "closed" systems. An open system, of which tourism is an example, interacts with the environment(s) in which it exists (Hall and Lew, 2009). Tourism is usually described as a complex system, which has many different consequences (Hall and Lew, 2009). "Simple cause and effect relationships among the elements rarely exist and instead a very small stimulus may cause unpredictably large effects or no effects at all" (Baggio, 2008, p. 4). A system is composed of elements and the relationships between elements. Elements are the basic units of a system. However, part of the art of systems analysis is the construction of a set of entities that form a relatively coherent

object of study and has a well-defined relationship with its environment. Systems are embedded within systems. What is regarded as an element of a system at one level of analysis may itself constitute a system at a lower level of analysis. This depends on the resolution and scale the work is conducted on (Hall and Lew, 2009). Baggio (2008, pp. 9–10) points out that: "A tourism destination is a complex agglomeration of diverse systems of interrelated economic, and environmental phenomena and networks". A system furthermore means abstracting from reality in a manner which makes it more understandable. Systems analysis cannot proceed without such abstraction (Dawson *et al.*, 2007; Hall and Lew, 2009).

Spatial concepts relate to tourism systems and the relationships between their elements which can occur at different levels of the systems and their subsystems, for example, at a local, regional, or national level (Nepal, 2007; McLennan *et al.*, 2010). An important element in systems analysis is defining the boundaries of a system, but at the same time boundaries are often difficult to define (Saarinen, 2004). The complexity of the concept of space as well as related concepts such as place, region, destination and landscape make it very challenging to understand the transformation of such an area (Saarinen, 2004).

A systems approach was used when the method for the Master Plan was constructed. As the work in the Master Plan was on a national level and covered the whole country it could not be too detailed. The working group did evaluate about half of Iceland and that area was divided into 57 tourism regions. The definition of their boundaries was based on the type of tourism, infrastructure and the physical properties of the region (Sæþórsdóttir and Ólafsson, 2010a, 2010b). As in most analyses of tourism systems, it was for several reasons problematic to define the spatial boundaries and the relative size of the regions used. The main problem is that where the boundaries are set affects the value of the tourism region. As Hall and Lew (2009, p. 73) point out:

> An important element in systems analysis is defining the boundaries of a system but at the same time boundaries are often difficult to define. The selection of the boundary of a destination, or any boundary when analysing impacts, will affect the relative size and degree of system change within that boundary. Therefore boundaries have to be imposed by application of judgement as to where a system begins and ends, and in relation to the problem that is to be solved.

The score for a certain element in the evaluation process can for example be affected by decisions such as on which side of a tourist cabin a boundary is drawn. The size of a tourism region also affects its value. If the defined region is small, it is less likely to contain many attributes that receive high grades than if the region is defined larger. Consequently, the value of small regions is likely to be lower than the value of their larger counterparts. To determine the effect of this would have required experimenting with regions of different size, but due to the short timeframe of the project this was not possible. To minimise this effect, the working group made an effort to define regions of similar size and with comparable features. It would have been preferable to divide the entire country into tourism regions, but only areas affected by the proposed power plant projects were divided into tourism regions and evaluated. These included most of the Highlands, but only small areas in the Lowlands.

The Delphi Method

The Delphi method is a qualitative research approach that uses evaluation by a panel of experts to address forecasting issues where decisions must be made in the absence of

adequate information (Linstone and Murray, 2002; Garrod and Fyall, 2005; Edwards *et al.*, 2008). This method has been used within a variety of fields, including tourism (Green *et al.*, 1990; Garrod and Fyall, 2000; Choi and Sirakaya, 2006; Lee *et al.*, 2008; Spenceley, 2008; Liggett *et al.*, 2011). The Delphi method has furthermore been widely used as a tool to apply multi-stakeholder approaches in policy-making (Gordon, 1994).

The idea behind the method is to use the knowledge of experts to evaluate objectively issues that require judgement on very complex issues that are not easily dealt with using conventional questionnaire or interview-based research methods (Linstone and Murray, 2002; Garrod and Fyall, 2005). That was certainly the case in the Master Plan project in which 84 proposed power plant projects were under evaluation, spread across an impact area covering half of Iceland (Sæþórsdóttir and Ólafsson, 2010a, 2010b).

In accordance with standard Delphi method structure, the members of a panel are selected on the basis of their knowledge and expertise in the relevant field. According to Garrod and Fyall (2005) the number of panel members is not considered to be a critical issue. However, Yeong *et al.* (1989) have recommended a panel size between 15 and 20, while Smith (1995) points out that a typical panel size is 40 to 50, although he also mentions that successful projects built on the Delphi method have been conducted with as few as four, and as many as 904 experts on the panel. A consideration that is even more important than the panel size, is that the panel should be "balanced" with regard to the background and competence of its experts (Garrod and Fyall, 2005).

In the working group for the Master Plan project there were nine experts that were selected following discussions involving the steering committee, the Ministry of Industry, the Ministry of the Environment, and the Ministry of Agriculture. These experts were:

- an economist who had worked for decades in the tourism sector and is a member of the Icelandic Travel Industry Association. She was the chairman of work group 2;
- a geographer who was a mountain tour guide, and the owner of a travel company that specialised in nature experiences;
- a physicist who was an associate professor and chairman of the University of Iceland Regional Research Centres;
- a farmer who was also an associate professor at the Agricultural University of Iceland;
- a geographer who was also the president of the Icelandic Travel Association, warden of Thingvellir National Park and a mountain tour guide;
- a biologist who was the Director of the Soil Conservation Service of Iceland;
- a high school geography teacher who was also a range manager;
- a biologist who was an inland fisheries specialist from the Institute of Freshwater Fisheries.
- an associate professor in tourism studies who was a former tour guide.

All members of the group were Icelanders, four of them were geographers, two biologists, and three worked, or had worked, as mountain tour guides. Three came from universities and three from governmental agencies. Two members came from the tourism industry, one of them the owner of a travel company that specialised in nature experiences. The other member of the tourism industry was the chairman of the work group. They regularly informed their colleagues in the Icelandic Travel Industry Association about the progress of the work and what assumptions were being made. The group members had travelled extensively in the Icelandic landscape and had good geographical knowledge of most of the areas under investigation in the Master Plan. Their experience also covered all of the most common recreational activities practised in Iceland with the exception of winter tourism (only one member of the working group was familiar with that field).

The working group went on three field trips, visiting most of the proposed power plant sites and consulting a number of local experts. Those visits were very useful, and the method was fine-tuned during those trips. The group also visited some of the areas where power plants have already been built and adjusted the method to fit those sites.

In the Delphi method, the experts usually complete a questionnaire or other form in order to systematically collect their views. Sæþórsdóttir and Ólafsson (2010a, 2010b) present a step-by-step description of the construction of the evaluation sheet and the arguments behind it.

Anonymity and feedback are important elements of the Delphi method. The argument for anonymity is that it is required to reduce the possibility that peer pressure, oratory, organisational commitment or personal characteristics influence the evaluation of the experts (Gordon, 1994; Rowe and Wright, 1999; Garrod and Fyall, 2005). However, not everyone is so strict. Linstone and Turoff (2002, p. 3), for example, talk about "some degree of anonymity". This ground rule, i.e. anonymity, was broken in the process of the working group. At the beginning, members of the group voted via an e-mail that was sent to the chairman. That was time consuming and the evaluation was such a huge task that after a while the working group gave up the anonymity in the voting system and started to complete the questionnaire during meetings. The working group members took turns in calling out their votes while taking care to avoid any peer pressure and avert the danger of undesirable psychological effects. The discussions often took a very long time, and the experts remained determined and did not change their vote unless they had been completely convinced to do so. This method allowed for immediate feedback, and the experts were able to evaluate and discuss the issues in depth and re-evaluate their opinions during the meeting.

The Delphi method has been criticised and there is considerable debate among academics regarding its value as a research methodology (Stewart, 1987; Rowe and Wright, 1999). Some have even said that the method is of no value as a research tool because of its weaknesses. It is very sensitive to many design characteristics such as the level of the panellists' expertise, the panel composition, the degree of clarity with which the questions are posed, how outliers are reported and how the survey is administered (Bowers, 1997). In Delphi projects where consensus is being sought, it is hard to decide when consensus has been reached and hence when to finish the project. As a working rule, consensus was sought among the experts in the work group. That was usually not very difficult, but discussions often took considerable time. On a few occasions consensus was not achieved and then the average of the votes decided the final grade.

Results from the Master Plan Project

When the tourism regions had been defined, all the most important attributes that characterise the tourism regions and differentiate between them were listed and grouped into categories and sub categories and given an appropriate weight by the group through a Delphi procedure. In total 43 attributes considered important for tourism and recreation were evaluated. Five main categories of attributes were used: experience, use, recreation opportunities, infrastructure and future value. Experience was considered the most important category and accounts for half the valuation score (see further description in Sæþórsdóttir and Ólafsson, 2010a). According to this method the most valuable tourism regions in Iceland are Jökulsárgljúfur (part of Vatnajökull National Park), the "developed" and popular Highland areas (Hveravellir, Askja, Torfajökull, Landmannalaugar, Sprengisandur and Eldgjá), and the highly developed (by Icelandic standards) destinations in the lowlands (Gullfoss and Mývatn, Figure 2).

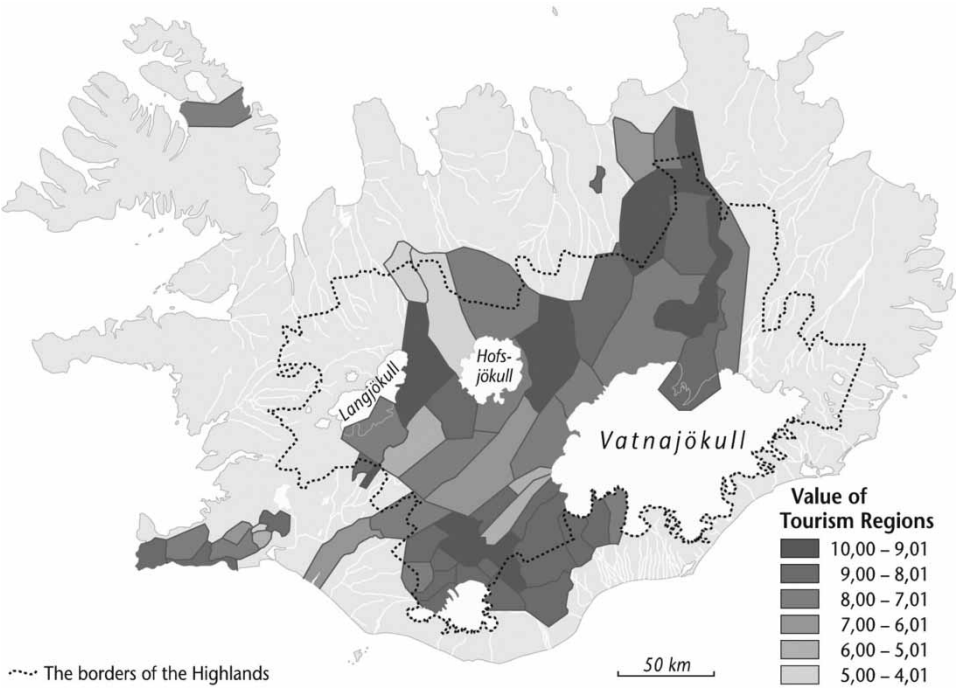

Figure 2. Value of tourism regions. *Sources*: Anna Dóra Sæþórsdóttir (2011).

When considering the impact of power plants, three kinds of regions are relevant: construction regions, impact regions and tourism regions. A construction region is defined as the area where the power plant is situated, including all the related constructions, e.g. buildings, lagoons, dams, canals, drill pads and pipes, as well as the areas where high-voltage power lines and roads built for the development go through. Hydro-power plants can additionally alter the water flow in rivers far away from the actual construction site causing waterfalls to be reduced and even disappear. Due to these changes, as well as the characteristics of tourism such as travel patterns, tourism will be affected in a larger area than just the construction region. The area in which tourism is affected is called the impact region. The boundaries of the impact region can be difficult to define, and in some cases the impact region could extend throughout the country as some proposed power plants are visible to almost every visitor to Iceland and might therefore impact their overall image of Iceland.

When estimating the impact of power stations the same methodology (attributes, score values and rating) was used as when assessing the present value of the tourism regions (Sæþórsdóttir and Ólafsson, 2010a, 2010b). The effects of power plant construction are most serious in the construction region, where many of the attributes in the experience category were downgraded as power plants are considered to affect natural features such as waterfalls, or dry up hot springs. In the impact region, but outside the construction region, a power plant project usually affects the attributes connected with naturalness and the size of the wilderness, but does not necessarily influence other attributes. An attempt was made to capture these extended effects in one number, an impact coefficient, so the proposed projects could be ranked. The impact coefficient depends on the present value of the affected tourist regions as well as the new value of the regions, as it is assumed to be after the power plant has been built. It is obtained by multiplying the present value of

the tourism region with the impact the power plant has on the region. The impact coefficient for a particular power plant is computed as the sum of the impact coefficients for all tourism regions affected by the plant. Tourists are mobile, and especially in the Highlands it was considered important to take into account impacts outside of the actual construction region when considering tourism and recreation as "what goes on outside of, but adjacent to, a wilderness can have substantial impacts inside its boundary" (Hendee *et al.*, 1990, pp. 190–91). Lesslie *et al.* (1991, p. 20) point out that:

> a development in lesser quality wilderness on the margin of an area of higher quality wilderness will reduce wilderness quality within the higher quality area. The lesson to be drawn from this is that areas of lower quality wilderness which fringe areas of high quality are important in maintaining these quality areas. In order to ensure protection of wilderness quality, a wilderness management area therefore must include all marginal areas.

The results from the evaluation were that the impact coefficient is highest in valuable tourist areas where the impact is large and where the affected area covers many tourism regions. The results indicate that wilderness areas are very sensitive to power plant developments and that the largest effects would be in wilderness areas, which are already of great importance for tourism and recreation (Figure 3). Such an approach reinforces two of the principles of wilderness management put forward by Hendee *et al.* (1990), that is the importance of managing wilderness as one extreme on the environmental modification spectrum, and the need to manage wilderness comprehensively, versus as separate parts.

According to the results of the working group in the Master Plan project, power plants should definitely not be built in the South Central Highlands and preferably not in the Highlands at all as these areas are very valuable for tourism. Over twenty power plants

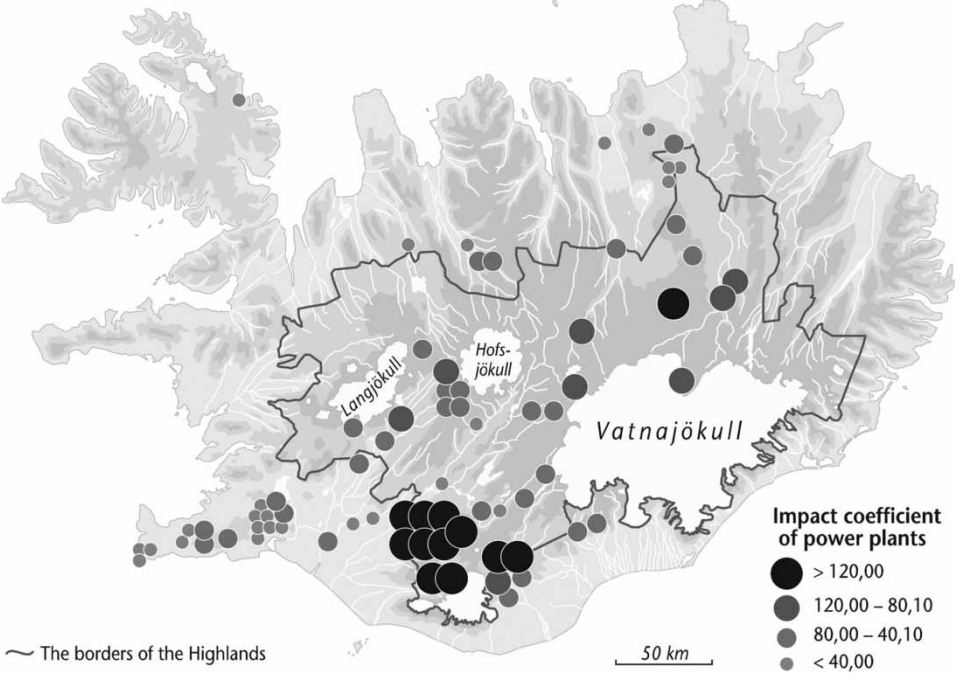

Figure 3. The effects of proposed power plant projects on nature–based and wilderness tourism and recreation. *Sources*: Anna Dóra Sæþórsdóttir (2011).

proposals in other areas would, on the other hand, have relatively little effect on tourism and could therefore be developed without any major effect on the tourist industry and the Highlands, the foundation of wilderness tourism in Iceland. Of course, the picture is more complex than this, as more factors need to be considered, for example nature conservation and regional development.

When the four work groups in the Master Plan project finished their work in the spring of 2010 a public hearing process started. A report describing the methodology and the results from the work groups was published (Rammaáætlun, 2010) and open meetings were held to inform the general public as well as the various stakeholders. At the same time the public were invited to send in comments. In total 39 comments/opinions were received, from individuals as well as organisations and companies. The comments were evaluated by the steering committee and combined with the results from the working groups, thereby aiming to take into account the interests of all stakeholders in the Highlands: nature, tourism, recreation, agriculture, fishing and regional development (Rammaáætlun, 2011a). Then the Ministry of Industry and the Ministry for the Environment, with the help of the chairmen of the four working groups and the chairman of the steering committee sorted the power plant proposals into three categories; "exploitation permitted", "needs further research" or "exploitation not permitted". The Icelandic public were then asked to comment on the results, to which 225 parties responded (Rammaáætlun, 2011b). The responses were then evaluated by the Ministries and a few changes made to the final ranking; two power plant proposals were withdrawn for legal reasons, and six were moved from the "exploitation permitted" category to the category "needs further research" as "it is regarded necessary to look further into the impact of those proposals" (Althingi, 2012). These last changes have been criticised by those who want further power plant development. They claim that politics should not have been involved at this very last stage of the Master Plan process and that the ranking should have been based purely on the scientific work. Nature conservation groups have on the other hand criticised the results for not protecting nature enough. The final ranking has now been drawn into a parliamentary proposal (Althingi, 2012) and in the summer of 2012 is being discussed in the Icelandic parliament.

Conclusion

Natural resource planning and management problems are "wicked and messy" and involve multiple and competing values with little scientific agreement on cause–effect relationships (Lachapelle and McCool, 2005). The Icelandic nation is very dependent on natural resources for its economic welfare so it will be a major challenge for the nation to utilise its natural resources in a sustainable way so they can support the population in the future. It is therefore a challenging political task to ensure that agreement will be reached on the utilisation of the Highlands where the interests of all users are taken into account. In the Master Plan for Geothermal and Hydropower Development project this political challenge was approached by asking external scientists to evaluate the effect of power plant proposals. This way of dealing with complex problems where politicians use scientific work directly is innovative and not commonly used. Another example is the Norwegian Master Plan for Water Resources that was partly used as a model for the Icelandic Master Plan (Samlet Plan for Vassdrag, 1984; Carlsen *et al.*, 1993; Thórhallsdóttir, 2007b).

In this paper a method is introduced that was developed in phase 2 of the Master Plan for the purpose of estimating the effect of power plants on tourism and outdoor recreation. The methodology builds on a systems approach and the Delphi method. Although the protocols

of the Delphi method were not fully followed the method proved useful. The panel size was clearly at its minimum according to Yeong *et al.* (1989) and Smith (1995). However, having fewer panel members helped the work as the discussions were more dynamic and it was easier to come to consensus and conclusions than in a larger group. In phase 1 of the Master Plan project, which ran from 1999 to 2003, the size of the working groups was twice the size of the ones in phase 2, which made it more difficult to come to conclusions, and as the work group evaluating the effect on tourism disagreed on general assumptions, consensus was not reached and consequently no results were obtained.

Another difference between phase 1 and 2 was that tourism and outdoor recreation were evaluated in different groups in phase 1, while in phase 2 tourism and outdoor recreation were evaluated together (Rammaáætlun, 2011a). Although tourism and outdoor recreation are related in many ways they can also have very opposite goals. For example, the more the merrier for some of the tourism industry companies, while solitude is of great importance to wilderness recreationalists. To evaluate tourism and recreation together might have caused disagreement, but this turned out not to be the case.

No objections against the methodology, or the results, came from the industry during the study period. That is somewhat surprising as the tourism industry consists of many diverse stakeholders and their interests are very diverse, as Holden (2008) points out. This makes systematic evaluation and planning of tourism development a very complex problem. The complexity increases even further when the interests of stakeholders other than tourism and outdoor recreation are taken into account. Therefore reaching a conclusion is not guaranteed in a project like this.

The Delphi method has been criticised and academics disagree about its value, but the reality for much of tourism planning is that resources, including data based on research, are frequently not available. Even in these circumstances limited research and imperfect methodology will be useful and will give better results than no research at all. This was the case in this study where a rapid evaluation of the natural resource needed to be undertaken. The process has been useful and at the end of it the interests of tourism and recreation have become a much more significant part of the spatial planning process in the country than has hitherto been the case. As in the process described here, where a decision has to be made between the interests of tourism and power generation for example, the decision between the interests of different users is ultimately a political one. In the Icelandic Master Plan project science has been brought into this political arena, but whether the politicians will come to a conclusion on this complex matter and utilise the scientific work only time will show.

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