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# Renewable Energy in Wilderness Landscapes: Visitors' Perspectives

Edita Tverijonaite <sup>1,\*</sup>, Anna Dóra Sæþórsdóttir <sup>1</sup> , Rannveig Ólafsdóttir <sup>1</sup>  and C. Michael Hall <sup>2</sup> 

<sup>1</sup> Faculty of Life and Environmental Sciences, University of Iceland, 101 Reykjavik, Iceland; annadora@hi.is (A.D.S.); ranny@hi.is (R.Ó.)

<sup>2</sup> Department of Management, Marketing and Entrepreneurship, University of Canterbury, Christchurch 8140 2, New Zealand; michael.hall@canterbury.ac.nz

\* Correspondence: edt1@hi.is; Tel.: +354-8476-121

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**Abstract:** Increasing the share of renewable energy in the energy mix is of crucial importance for climate change mitigation. However, as renewable energy development often changes the visual appearance of landscapes and might affect other industries relying on them, such as nature-based tourism, it therefore requires careful planning. This is especially true in Iceland, a country rich in renewable energy resources and a popular nature-based tourism destination. The present study investigated the potential impacts on tourism of the proposed Hverfisfljót hydropower plant by identifying the main attractions of the area as well as by analyzing visitors' perceptions, preferences and attitudes, and the place meanings they assign to the landscape of the area. The data for the study were collected using onsite questionnaire surveys, interviews with visitors to the area, open-ended diaries, and participant observation. The results reveal that the area of the proposed power plant is perceived as wilderness by its visitors, who seek environmental settings related to the components of a wilderness experience. Visitors were highly satisfied with the present settings and preferred to protect the area from development to ensure the provision of currently available recreational opportunities. The results further show that the proposed Hverfisfljót hydropower plant would reduce the attractiveness of the area to its visitors, degrade their wilderness experience, and therefore strongly reduce their interest in visiting the area. Moreover, the participants perceived the already developed lowlands of the country as more suitable for renewable energy development than the undeveloped highland areas, which is in line with the principles of smart practices for renewable energy development.

**Keywords:** renewable energy; energy infrastructure; nature-based tourism; visual impacts; wilderness; visitor

## 1. Introduction

The importance of renewable energy (RE) production is increasing worldwide in light of the continuing growth in demand for electricity and, simultaneously, the need to mitigate climate change. Ensuring access to reliable sustainable energy by increasing the share of renewable energy worldwide, among other actions, is listed as goal 7 of the 17 Sustainable Development Goals set in the United Nations 2030 Agenda for Sustainable Development [1]. Among renewable energy sources, hydropower currently constitutes the largest part: 15.8% of all electricity produced worldwide in 2018 came from hydropower, which is more than from all other renewable energy sources combined [2]. Although hydropower is currently expanding at a slower pace compared to solar photovoltaic and wind power [3], hydropower capacity is still increasing [4]. It most likely will remain an important component of

the renewable energy mix due to its ability to quickly change the amount of electricity supplied and complement intermittent renewable energy sources such as wind and solar energy [5–7]. According to the International Hydropower Association (IHA) [8], the global median greenhouse gas emission intensity of hydropower reservoirs is around 18.5 gCO<sub>2</sub> –eq/kWh, which is significantly lower than that of coal (820 gCO<sub>2</sub> –eq/kWh) or gas (490 gCO<sub>2</sub> –eq/kWh) [9]. The IHA [8] emphasizes that run-of-river hydropower projects have even lower emissions. Thus, hydropower production is a feasible and important solution for climate change mitigation. However, many studies [10,11] have pointed out various negative environmental impacts of hydropower plants, which should be taken into consideration when planning energy production.

While the environmental impacts of small-scale in-stream hydro-turbines are considered to be relatively small [12], numerous researchers [3,13,14] have pointed out that hydropower plants containing dams might result in numerous and diverse negative impacts on the surrounding environment. Moreover, beyond hydropower infrastructure that comprises dams, reservoirs, canals, and power stations, hydropower plant projects generally include the development of new roads for the construction and maintenance of a power plant as well as the building of new transmission lines, which also have been shown to have various environmental and social impacts, such as habitat fragmentation, loss of valued landscapes, and increased visitation due to improved access [15]. Therefore, hydropower infrastructure development affects other industries that rely on landscapes as a resource, such as nature-based tourism, which might lead to land use conflicts between the two industries. This is especially relevant in wilderness areas and pristine nature, since people choosing such areas for recreation often prefer a minimal amount of infrastructure and a low level of use [16,17].

Iceland is a popular nature-based tourism destination and a country rich in renewable resources. In 2018, a total of 69.66% of all electricity produced in Iceland derived from hydropower, 30.31% came from geothermal plants, and 0.02% of electricity was produced from wind [18]. With the aim of ensuring that sustainable energy development considers the interests of various stakeholders, in 1999 the Icelandic government designed a “Master Plan for Nature Protection and Energy Utilization”. It evaluated proposed energy development options and categorized them into energy utilization or protection categories [19]. Some proposed options lacking the data necessary for decision-making were put into an “on hold” category, requiring further research. The present study was one portion of the research conducted for the “Master Plan”, and it aimed to assess the potential impacts on tourism and recreation of the proposed Hverfisfljót hydropower plant, whose categorization required further research [20]. The proposed hydropower plant would be located in southern Iceland in a highland area characterized by limited accessibility and accordingly very low recreational use.

The objective of this paper was to evaluate the potential impacts of the proposed Hverfisfljót hydropower plant on the tourist experience. This was accomplished (I) by identifying the main attractions of the area to its visitors and (II) by investigating visitor perceptions, preferences, and attitudes toward renewable energy and other infrastructure development in the area of the proposed power plant. Furthermore, by using a phenomenological approach originating from Husserl [21], the study examined what meanings visitors assign to the landscapes of the study area and the compatibility of these meanings with renewable energy development.

## 2. Landscape: A Place Created in a Visitor’s Mind

Pereira and Long [22] emphasized that when analyzing the relationships between people and spaces, both physical and symbolic aspects have to be taken into consideration. While physical spaces refer to landscapes, symbolic spaces describe the image of a landscape created in a person’s mind [23]. Furthermore, as has been pointed out by numerous authors [24–26], it is the meaning ascribed by people to a certain space that transforms it into a place. By visiting, experiencing, and getting to know landscapes, people ascribe certain values to them, thereby transforming their understanding of a location into one of place, a meaning-based concept [27]. Emotional relationships with a place are created by experiences that make the place meaningful [28,29]. According to Cheng, Kruger,

and Daniels [30] (p. 89), “Place meanings encompass instrumental or utilitarian values as well as intangible values such as belonging, attachment, beauty, and spirituality. This definition explicitly acknowledges the subjectivity of people’s encounters with places.” Thus, due to the multifaceted and complex nature of meanings created during the person–space–place interaction, one space can contain multiple places, i.e., it can have different meanings for different people [27,31]. For example, the same undeveloped natural area will be perceived as different places by park managers, local communities, and tourists [32]. Moreover, place meanings might also differ on an individual level [33].

Favorable place meanings assigned to a certain place can contribute to a stronger bond between the person and the place [27]. According to Eisenhauer [34], particularly strong person–place bonds are created while people engage in recreational activities. These bonds can deeply affect people’s attitudes regarding issues related to these places and can even affect their behavior [35]. This might lead to a higher willingness to protect an area from environmental change in order to preserve its value [36,37]. Therefore, the concept of place meanings has been proposed by various researchers [30,34,38] as a tool to be included in the management of natural resources, since it allows for the consideration of stakeholders’ attitudes and preferences in decision-making and helps avoid treating landscapes as a commodity [38]. Moreover, such inclusion allows for acknowledgment of the complexity of landscapes and their connections with humans [30]. Landscape, according to Greider and Garkovich [32] (p. 1), can be defined as “the symbolic environment created by a human act of conferring meaning on nature and the environment”. The European Landscape Convention [39] (p. 2) also includes the aspect of human perception in the definition of landscape: “Landscape means an area, as perceived by people, whose character is the result of the action and interaction of natural and/or human factors.” Thus, landscapes strongly relate to the definition of place [30].

When discussing the person–place relationship using the approach of social constructs, Stedman [27] emphasized the importance of the effects that landscape characteristics have on people’s place attachment and satisfaction and stressed that changes in the physical environment will most likely affect the person–place interaction and change the meanings a person ascribes to a place. Kühne [40] emphasized the role of aesthetic interpretation in the social construction of landscape, which was in line with previous research [41–45] concluding that visual impacts of renewable energy infrastructure play a crucial role in their public acceptability. For such infrastructure to be socially acceptable, it has to positively fit the landscape type and the identity of the place [46,47]. Thus, visual changes brought to a natural landscape by renewable energy development are likely to affect visitors’ experience, although the scale and character of the effects will depend on the meanings the visitors assign to a certain landscape.

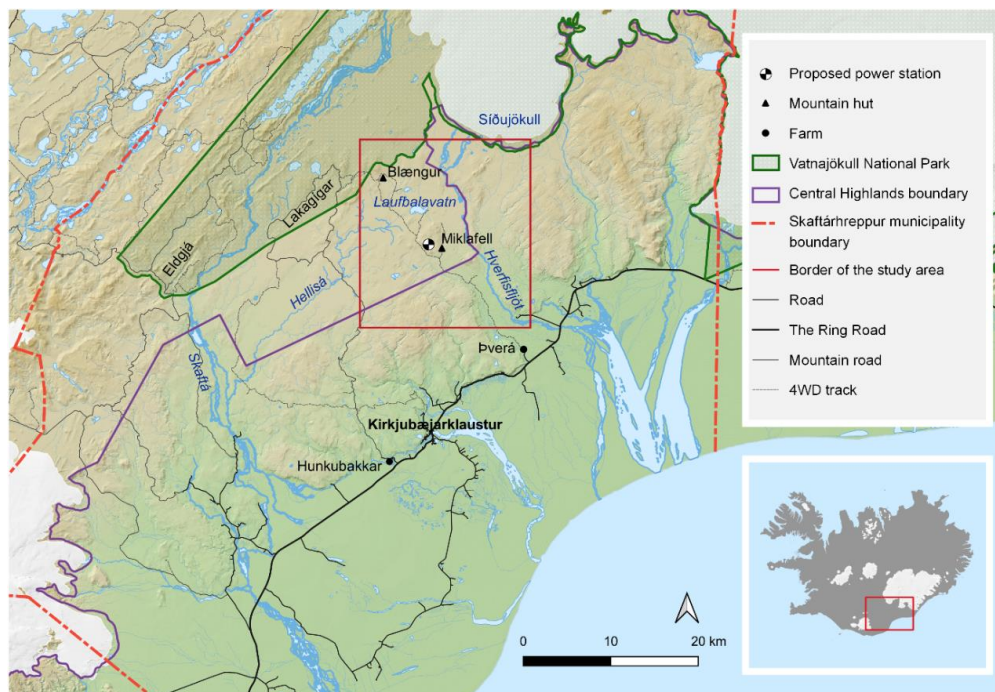
Studies have shown that tourists perceive energy landscapes in different ways. While some visitors tend to avoid the areas where energy infrastructure is built, to others such infrastructure seems to become an attraction [48–50]. Frantál and Urbánková [51] described the interrelationships between tourism and energy from three perspectives. First, energy development can constrain nature-based tourism due to visual impacts and landscape degradation. Second, energy landscapes can become tourist attractions in their own right. Lastly, tourism relies on an energy supply for its operations and is a significant energy consumer and contributor to CO<sub>2</sub> emissions. Whether an encounter between a tourist and energy infrastructure in a nature destination will be positive or negative depends, among other factors, on the meanings people assign to the landscape and the perceived suitability of energy infrastructure. Gailing and Leibenath [52] showed that people supporting renewable energy development in a natural area perceive it as part of the cultural landscape. Accordingly, they view the use of the area to harness energy as a significant contribution to climate change mitigation. On the other hand, the opponents of energy infrastructure development perceive the same landscape as a home to a wide range of species providing various recreation opportunities that should be protected. Thus, on the basis of their beliefs and values, people create a social construct of a natural area that shapes their attitudes toward energy development.

The conflicts between tourism and renewable energy development are especially likely in wilderness areas due to certain meanings and expectations of visitors related to the concept of wilderness, such as solitude, peace, primitiveness, and a lack of human intervention [16,53,54]. Numerous studies focusing on nature-based tourism in the central highlands of Iceland have shown that a wilderness experience is one of the main attractions of the area [17,55–58]. Consequently, highland visitors state that energy infrastructure would make the area less attractive as a tourist destination and reduce the quality of their experience [16,57]. Interestingly, a study conducted at the edge of the central highlands with an existing hydropower plant revealed that visitors were more positive toward renewable energy infrastructure compared to visitors to other highland areas where hydropower plants had been proposed but not yet built [59]. This supports the notion of the landscape as a social construct and a place intertwined with meanings: in an area perceived as wilderness, support for energy infrastructure was much lower compared to an already developed area. Moreover, this confirms that visual landscape alterations lead to changes in meanings ascribed to the landscape and to changes in visitor attitudes [27]. Therefore, before developing renewable energy infrastructure in wilderness areas, it is important to evaluate the importance of these areas for nature-based tourism and to investigate what meanings visitors ascribe to the landscapes, what expectations they have before visiting the area, how these expectations are met, and how the visitor experience would change if renewable energy infrastructure were to be constructed.

### 3. Research Settings

#### 3.1. Tourism in the Highlands of Skaftárhreppur Municipality

The proposed Hverfisfljót hydropower plant is planned for the highlands of Skaftárhreppur municipality in southern Iceland (Figure 1). The municipality is the second largest in the country [60], but its population is very small. However, the population increased from 452 inhabitants in 2014 to 583 in 2019 [61]. This rapid increase was most likely related to the growth of the tourism industry in the area [62].



**Figure 1.** The location of the study area within Skaftárhreppur municipality (based on data from the National Land Survey of Iceland IS50V geodatabase).



Since Iceland's main road, also called the Ring Road, crosses Skaftárhreppur from west to east, the municipality receives a flow of tourists, most of whom travel along the Ring Road and stop at the main tourist attractions. However, only a relatively small proportion visit the highlands of the municipality. The most frequently visited locations in the municipality's highlands are the volcanic fissure of Eldgjá (around 10,600 visitors in 2017) and the volcanic craters of Laki, also known as Lakagígar (around 8800 visitors in 2017) [63]. Both sites are located in Vatnajökull National Park, one of the largest national parks in Europe. The study area was located just outside the national park, a few kilometers east of the Laki craters (Figure 1), and it receives a much lower number of visitors than does the Laki area.

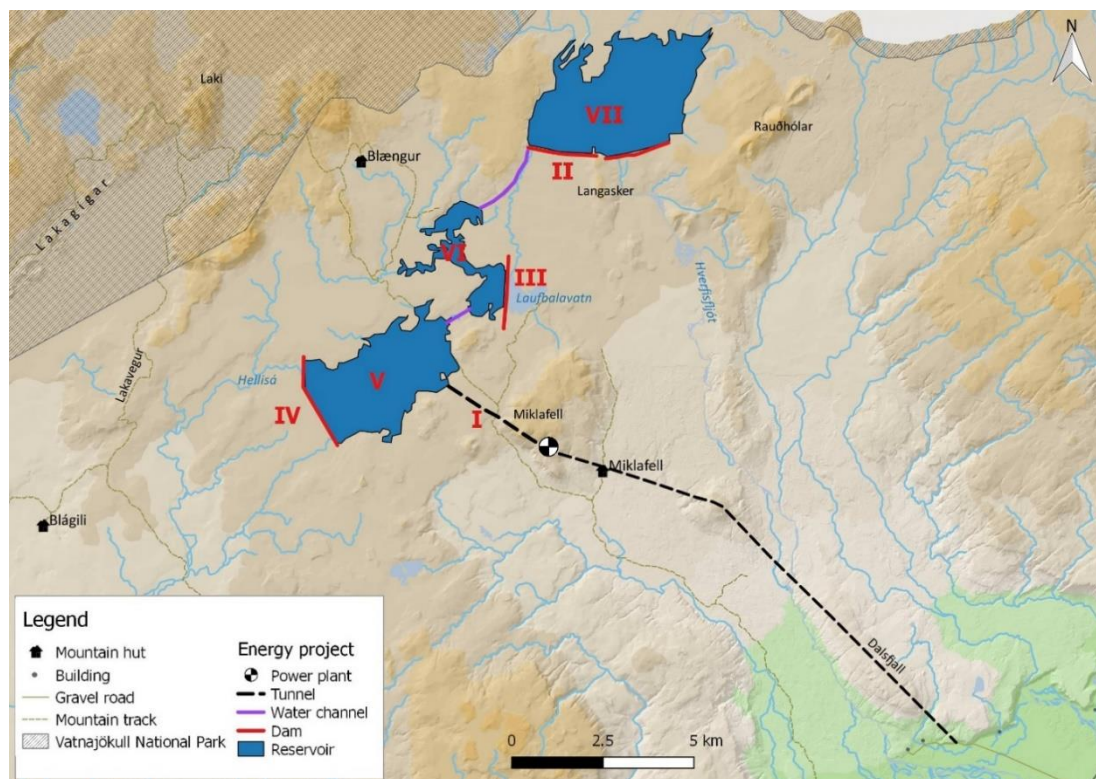
The study area included the site where the proposed power plant infrastructure (dams, reservoirs, water channels, a tunnel, and a power station) would be situated. It also included the Hverfisfljót and Hellisá rivers (which would be harnessed by the proposed power plant, since development would reduce their water volume) as well as the surrounding areas that would be directly affected by the proposed power plant infrastructure. Thus, the study area covered approximately 420 km<sup>2</sup> and reached west of the Blængur hut, continued up to the Síðujökull glacier in the north, stretched south to the Miklafell hut, and included the Hverfisfljót River in the east (Figure 1).

The study area, as well as the Laki craters, was located between the glacial rivers of Hverfisfljót in the east and Skaftá in the west, both of which are bridged only on the Ring Road. Thus, both areas have limited accessibility. To reach the Laki craters, the majority of visitors drive a mountain road that is only passable by 4WD vehicles and requires several river crossings. The western part of the study area is connected with the Laki craters by a small dirt track that passes by the Blængur and Miklafell mountain huts and reaches the Ring Road south of the Þverá farm (Figure 1). East of the river Hverfisfljót, there are no roads or dirt tracks.

The landscape of the study area was shaped by interactions between glaciers, volcanoes, and freshwater springs. Part of the study area is covered by an extensive lava field called Eldhraun, which resulted from the Laki eruption of 1783–1784, one of the biggest basaltic flood lava eruptions in Iceland's history [64]. At the edge of the Eldhraun lava field, east of Laufbalavatn Lake, an extensive system of lava tubes containing over 200 caves was created by the eruption. Since the area contains numerous freshwater sinks, water cascading into the lava tube caves can be observed in the study area [65].

### 3.2. Hverfisfljót Hydropower Plant

The proposed 42-MW Hverfisfljót hydropower plant is designed to harness energy from the Hverfisfljót and Hellisá rivers (Figure 2). The power station would be built underground and would be located on the southern side of the mountain Miklafell. A 3.2-km-long underground tunnel (see I in Figure 2) would be constructed for the transportation of water from the reservoirs to the power station. The proposed power plant would contain four dams: two of them would be located on the eastern and western sides of Langasker (see II in Figure 2), one would be in Laufbalavatn (see III in Figure 2), and one would be west of Miklafell (see IV in Figure 2). With the help of the four dams, three reservoirs would be created. The reservoir west of Miklafell (see V in Figure 2) would cover 8.6 km<sup>2</sup> at its highest water level and 5 km<sup>2</sup> at its lowest, the reservoir west of Laufbalavatn (see VI in Figure 2) would be 2.2 km<sup>2</sup> at its highest water level, and the reservoir north of Langasker (see VII in Figure 2) would be 11.4 km<sup>2</sup> at its highest water level and 5.5 km<sup>2</sup> at its lowest. Two water channels would connect the reservoirs, with the total length of the channels being 3.1 km. Part of the road currently crossing the area would be submerged. Thus, it would no longer be possible to access Blængur and Lakagígar using the road. A new road is being planned from Þverá to the construction area of the proposed power plant; however, it is not yet known whether a bridge connecting the parts of the separated road would be constructed [66].



**Figure 2.** The proposed Hverfisfljót hydropower plant and its infrastructure [66]. Red roman numerals refer to the text describing the proposed power plant above.

## 4. Methods

### 4.1. Research Approach and Design

Research on tourism in remote and wilderness areas presents specific problems [67,68]. Although tourism is often of great economic significance in such areas, the actual number of tourists is low, and they are often highly dispersed, which makes research access to potential respondents difficult [69,70]. Therefore, mixed research methods were chosen for this study, which included a questionnaire survey, semi-structured interviews, open-ended diaries, and participant observation.

Questionnaire surveys were employed with the aim of producing representative and comparable results and identifying trends and patterns in visitor perceptions, preferences, and attitudes [71]. Questionnaire surveys were used to gather information regarding the following:

1. Visitor perceptions and satisfaction;
2. Preferences regarding infrastructure and level of use;
3. Attitudes toward the proposed hydropower plant and toward renewable energy development in general; and
4. Demographic data.

Questionnaires were available in three languages (English, Icelandic, and French), and it took 10 to 15 min on average for the participants to fill them in.

The questionnaire survey was complemented by semi-structured interviews to add explanatory power to the research as well as to obtain a deeper understanding of tourists' perceptions and the meanings they attach to certain places or objects [72]. Semi-structured interviews were selected for this study since asking a set of predetermined questions allowed for the collection of data that were comparable between different sites and cases, while asking additional probe questions based on the answers of the interviewee provided an opportunity to receive more in-depth information regarding the topic that could not have been predicted by the researcher [72,73].

The interviews included predetermined questions focusing on the following:

1. The reasons for the visit to the area and the main attractions of the area;
2. Environmental qualities that visitors are seeking during such a trip;
3. Perceptions of the area;
4. Preferred future management of the area; and
5. The potential effects of the proposed hydropower plant on the visitor experience.

Additionally, open-ended diaries kept by the participants were employed focusing on the self-reported experiences in the study area, which through introspection provided additional insight into the participants' points of view [74].

Finally, participant observation was also included since, as has been pointed out by numerous researchers [75,76], this positively contributes to the validity of research by providing a better understanding of the context and thereby facilitating data interpretation.

The present study was built on the phenomenological approach, which focuses on participants' experiences and aims to understand how individuals perceive particular phenomena, why they experience them in a certain way, and how they construct the surrounding world [77]. A mixed methods research design was chosen for this study since it is among the most suitable for such an approach [78]. While quantitative data provided information about the main trends in visitor perceptions and attitudes, qualitative interviews, open-ended diaries and participant observation allowed for the development of further insights into the ways visitors perceive and experience the area in question, the meanings they assign to the landscape of the area and to renewable energy infrastructure, their opinions regarding the suitability of renewable energy infrastructure in natural landscapes, and the factors affecting these opinions.

#### 4.2. Data Collection

Initial observations on tourism in the study area showed that two tour operators offered organized tours in the study area in summer 2018. One offered backpacking tours and the other mountain bike tours.

Two backpacking tours were organized in the summer of 2018, the first of which took place from 1 to 5 July and the second of which took place from 2 to 6 August. The tours were five days long, and during the first two days, the participants hiked along the Hverfisfljót River. Over the next three days, the participants hiked further east. Those willing to continue the tour could hike for four more days, which the majority of the participants did. One of the authors of the present study joined the two backpacking tours. On the first day of the tours, she distributed notebooks and pencils to the participants and asked them to write down their positive/negative experiences and highlights after each day. On the second evening of the tours, after hiking through the study area with the proposed power plant, participants were asked to fill out a questionnaire, which was followed by an interview. In order to ensure that the participants understood which area was being discussed and that they had knowledge about the proposed hydropower plant, they were provided with a description of the power plant as well as a map of the study area, which presented the infrastructure of the proposed power plant (Figure 2). Since 7 participants joined the first backpacking tour and 8 participants joined the second tour, a total of 15 completed questionnaires were received, 15 interviews were conducted, and 15 diaries were collected at the end of the tours.

The biking tours were organized by a couple who owns a sheep farm located around 15 km south of the proposed Hverfisfljót hydropower plant. Their company offers day tours, multiday tours, as well as glamping (glamorous camping). One of the authors of the present study joined their mountain bike tour, and a total of four completed questionnaires were received from the participants of a tour that took place in the study area.

In order to include independent travelers to the study area in the sample and to assess the level of use of the area for recreation, visitors traveling the road connecting the Þverá farm with Laki via

Miklafell and Blængur (cf. Figure 1) were surveyed and interviewed between 27 and 29 July 2018. Four people (all Icelandic) in two cars drove the mountain track crossing the study area during these three days. All four visitors agreed to fill in the questionnaire, and two agreed to participate in an interview. Furthermore, empty questionnaires with a map, a description of the proposed Hverfisfljót hydropower plant, and a cover letter were left in the Miklafell hut with the aim of increasing the research sample. The questionnaires were available in the hut from 29 July until 5 October. During this period, nine guests (all Icelandic) filled in the questionnaires.

Thus, the total sample included 32 questionnaires, 17 interviews, and 15 open-ended diaries. On the basis of interviews with the managers of the mountain huts and the tour operators organizing tours in the area, it can be roughly estimated that 50–70 tourists visited the area in the summer of 2018. In winter, the area is more or less closed to jeeps due to snow, although some locals go there on snowmobiles. Thus, the sample included about half of all visitors to the area in 2018.

#### 4.3. Data Analysis

A quantitative analysis of the data collected via questionnaires was conducted using descriptive statistics. Due to the small size of the sample, inferential statistics could not be used. Several questions in the questionnaire used a five-point Likert scale, with the points ranging from one to five (assigned to descriptors ranging from “strongly disagree” to “strongly agree”). During the data analysis, the proportions for each answer and the means were calculated.

The sample of the questionnaire survey consisted of 19 male (59%) and 13 (41%) female participants. The age of the participants ranged from 14 to 70 years old, with the mean age of the sample being 47.4 years. The highest proportion of the participants in the research were Icelandic (13 people); the second largest group were U.S. Americans (9 people); 3 participants came from France; and other participants were from the United Kingdom, Italy, New Zealand (2 from each country), and Australia (1).

Qualitative data were analyzed using an inductive approach [79]. The 17 semi-structured interviews were transcribed, and together with the 15 open-ended diaries, they were analyzed thematically, meaning that they were divided into segments to which codes were assigned, and a set of primary themes related to the research questions was developed. Next, the codes were grouped into related categories, and redundant codes were removed. Major and minor themes were identified, which were used as a structural frame for the data presentation. Such an analysis allows for the identification of the most important themes emerging from a dataset [71] and is suitable for investigation of the meanings assigned by individuals to various phenomena [80].

## 5. Results

### 5.1. Main Attractions of the Area to Tourists

In order to identify which characteristics of the study area were perceived as the most attractive by the visitors and therefore of the highest value for tourism, the participants were asked during the interviews what, according to them, was the main attraction of the area. Many interviewees identified the diverse landscape, which comprises spectacular features such as craters, lava fields, lava tube caves, rivers, and glaciers, as the main attraction of the area. Another important attraction mentioned by the interviewees was the wilderness, unspoiled nature, and beauty of the area. Especially attractive and impressive to the visitors seemed to be the vastness of the wilderness landscapes, which allowed for the experience of solitude. According to participant 1, who took part in one of the backpacking tours through the study area, the main attraction of the area could be described as “this depth as far as you can see around you, and you can see quite far, you cannot see anything else than nature, not any other groups, no one else”.

This vast undeveloped natural area allowed for unique experiences: “All that you can see around was untouched . . . It’s quite impressive to find a place, where you have a feeling that you are the first one to be there, and that’s quite fascinating.”



According to the interviewees, the fact that such a vast natural area unchanged by humans was located close to the European mainland added value to the area. Participants 2 and 3, a couple who joined the backpacking tour, described it as follows:

A huge area, horizon is very far, there is a variety of landscape all around, for kilometers and kilometers. And it's quite unique I would say, I don't recall such place in Europe. In continental Europe it's very difficult, there is a few left, but it's not that big, not walk for days and days without meeting anybody else and anything else. . . . And honestly, from our place it is about three and half hours' flight, so it's quite convenient.

The data collected via open-ended diaries focusing on the highlights of the visitor experience in the study area provided similar results. The diversity of the area and the uniqueness of its landscapes stood out to the visitors, as well as the powerful beauty of the Hverfisfljót River: "The amount of water here in Vatnajökull is beyond belief. Streams abound with busy flows that quickly become rivers. The highlight however was the waterfalls. I could stand and watch for hours."

The characteristics of the area, which allow for a wilderness experience, also came up frequently in the open-ended diaries. According to participant 4, the remoteness of the area was the feature that made the study area stand out from other Icelandic nature destinations, since it provides the opportunity to enjoy the beauty of nature in solitude or in a small group of likeminded people:

Remoteness. I am grateful that places exist where it is possible to go and lose yourself. After enjoying the beautiful scenery of Laugavegur it was a pleasant change to walk all today and not see another person other than from your group. The remoteness provides a serenity matched in few places in the world which also have so much raw beauty.

The possibility to escape the crowds and to experience solitude was mentioned also by numerous other participants as one of the highlights of their trip: "The sudden change from the crowded highway with all sorts of people enjoying all sorts of activities . . . To the beauty of solitude."

These results were supported by the answers to the open-ended questions asked in the questionnaire survey: "What fascinates you in the area?" (Table 1). The highest proportion of the respondents (32%) were fascinated by the wilderness and unspoiled nature of the area, with the same proportion being fascinated by the views. Other fascinating aspects included beautiful nature and the landscape, geology, and diversity of the area, as well as the Hverfisfljót River and its waterfalls. Since some of the respondents mentioned more than one aspect, the sum of the percentages was higher than 100%.

**Table 1.** Characteristics of the study area perceived as most fascinating by the visitors and reasons for visiting the area.

Most Fascinating Characteristics of the Area	%	Reasons for Visiting the Area	%
Unspoiled nature/wilderness	32.3	Hiking/trekking/backpacking	28.1
Views	32.3	Nature	25.0
Beautiful nature/landscape	29.0	Mountain biking	18.8
Geology	29.0	Caving	18.8
Diversity	22.6	The waterfalls of Hverfisfljót	12.5
Hverfisfljót and its waterfalls	22.6	Experiencing wilderness	9.4
Unique nature	16.1	Volcanic landscape	9.4
Peace	12.9	Challenge	9.4

The diverse landscape of the area provides a wide range of opportunities for recreational activities for visitors (Table 1). The answers of the questionnaire survey to the open-ended question "Did you come to do/see/visit anything in particular in the area?" showed that 28% of the study participants came for hiking, trekking, or backpacking, while around 19% came for mountain biking and the same

proportion for caving. Seeing the nature of the area (25%) and the waterfalls of Hverfisfljót (13%) were also mentioned among the reasons for visiting. A smaller proportion of the respondents (over 9% for each category) stated that they came to the area to experience wilderness, to see volcanic landscapes, or to challenge themselves.

### 5.2. Visitor Perceptions of the Study Area

In order to investigate how respondents perceive the study area, the questionnaire contained a multiple-item question for which a five-point Likert scale with opposing characteristics was used. The vast majority (over 93%) of respondents perceived the area around the river of Hverfisfljót as very quiet and natural (Figure 3), almost 87% found the area very impressive, and around 84% thought that the area was very beautiful. The opinions of the participants differed strongly when asked about the accessibility of the area: while over 53% found the area somewhat or very accessible, almost 37% perceived the area as very or somewhat inaccessible.

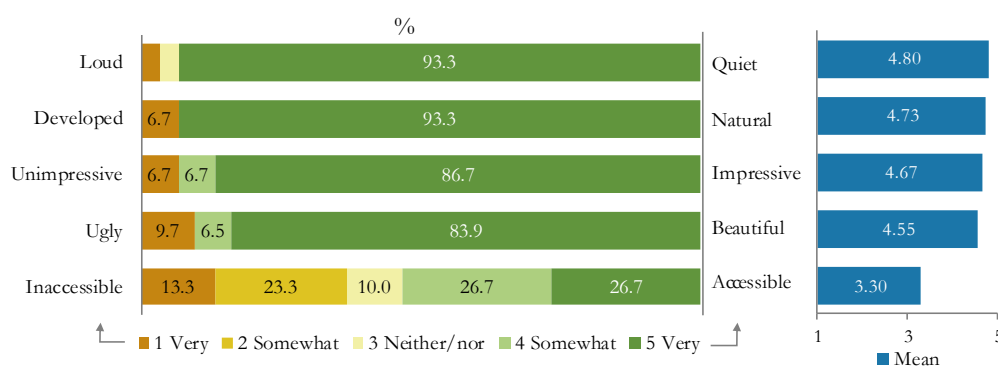


Figure 3. Visitor perceptions of the area.

Deeper insights regarding preconceived images of the study area were provided by an analysis of visitor expectations and environmental settings that participants were seeking on their trip. Several aspects were mentioned during the interviews. One of the environmental qualities that the participants were seeking in the area was natural beauty and landscapes that were not degraded by any construction or other human impacts. According to participant 4, on a trip like this, he seeks an environment that could be described as “natural, raw . . . ” The interviewee further added: “So yesterday, I would describe yesterday in my journal as raw beauty, it’s very natural, it’s very rugged, it’s very earthy, and that interests me.” Not seeing any human impacts seemed to be important to the interviewees. Participant 5 stated that she seeks “no human impacts, or maybe there is, but I cannot see it . . . ” This answer is in line with the opinion of participant 1: “I would say the top would be if there is no trace of human activity at all . . . ”

People also chose recreation in the study area to escape everyday life by immersing themselves in nature and disconnecting from work, daily life, and phone services. This seemed to be the case for participant 6, who chose the backpacking tour through the area “because I was looking for some sort of hike to get away from my daily routine and to meet new people in somewhere that’s natural with things to see.” Peace and quiet were also identified by numerous interviewees as important qualities for their experience while visiting the area.

Some of the visitors came to the area looking for a challenge. Participant 7 stated that he chose the backpacking tour through the area “because I am always looking for new challenges and last year I have done a challenge in the heat, so this year I wanted to do cold”. A similar answer was provided by participant 8: “I think the trip itself, it was getting out into untouched land, from what the itinerary told me it was just going to be something not everyone could do, you have to be a little bit athletically fit . . . ” Participants 9 and 10 noted that “it was the most challenging trek we could find that was extended, that was more than a day or two . . . ”

The opportunity to experience solitude was also identified as an important reason for visiting the area. Participant 1 explained: “I was looking for a trek where I would be out of the world basically . . . the idea was to be alone, not to see other tourists or other people than just you and connecting with nature.” Escaping the crowds was significant for participant 8, who described his preferred recreation environment as “untouched by man, not a lot of crowds, I think that’s one thing for me, ( . . . ) when you start getting large tour groups, it’s such a turn off”.

Seeking a spiritual experience in natural wilderness landscapes also came up during the interviews. Participant 11 explained, “My interest was to be in 100% nature where you can immerse yourself in it completely, where there is no infrastructure, no access for tourists or any commodification.”

The results of the questionnaire survey revealed very high satisfaction among visitors. Over 90% of the respondents stated that they were very satisfied with the nature in the area (Figure 4), and more than 81% answered that they were very satisfied with their stay in the area. This confirmed that the study area currently provides the environmental qualities visitors are seeking and meets their expectations.

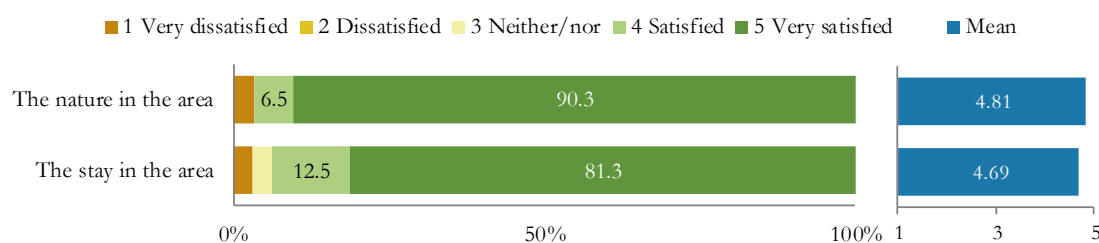


Figure 4. Visitor satisfaction with the stay and the natural environment.

### 5.3. Wilderness as Defined by Visitors

Since the majority of the participants perceived the study area as wilderness and identified wilderness as an aspect that they were seeking on their trip, during the interviews they were asked what characterizes a wilderness in their minds. One of the main aspects necessary for a wilderness experience, according to the interviewees, is the perceived absence of human intervention and human impacts: “no manmade structures”, “no trash left by others, no trace left behind”. The interviewees emphasized that this lack of signs of human activity creates the feeling for participants that they are “the first person to see all this”, which is a special experience to them since wilderness areas are becoming scarce and harder to find close to home: “Where we came from, it is hard to find wilderness areas that don’t have anything in there.”

Some interviewees, however, pointed out that certain types of human structures would be acceptable in a wilderness area, but it is important to manage infrastructure development in order to ensure that the wilderness experience in the area is not spoiled. As stated by participant 9, the wilderness can be described as “natural beauty, unspoiled, undeveloped. . . . No buildings, no power lines. Mountain huts are ok. But don’t lead to overdevelopment of the area, that’s the risk. You put a mountain hut there, and suddenly everybody will go there.” Thus, a lack of infrastructure was seen also as a tool to control visitor flows in the area and to ensure low levels of use, which also was identified by the interviewees as essential for unique experiences that visitors are seeking in wilderness areas: “Being able to do a trek or a backpacking trip and get away from the crowds is an experience that just a few take but it’s wonderful.”

Remoteness is another important characteristic of wilderness that was pointed out by the interviewees. Some related it to a challenge: “hard to get to, hard to travel through, and requiring effort”. For others, remoteness provides an opportunity to enter a totally different world away from their daily life and even from those people closest to them: “You come from civilization as a whole, can’t even get a signal in your phones, communicate with your loved ones, it’s just a completely different thing, something for us to experience, something not many people are going to experience.”

Hence, remoteness and the low accessibility of wilderness areas allow visitors to escape a routine and to disconnect from daily demands and worries in a totally different environment. As pointed out by participant 12, a reliance on natural resources and the use of them during the trip also enriched the wilderness experience by contributing to the feeling that civilization was left far behind: “I am sitting, I am trying to find comfort on a rock, I am using hot springs to get clean, or I am drinking water from a spring . . . everything I am doing is outdoors.” Participant 13 summarized wilderness as “the absence of human intervention, infrastructure or impact”, which was supported by the answers of other interviewees. Wilderness was seen by the interviewees as an opposite to civilization, human activity, and the impacts related to it.

The answers of the interviewees regarding built structures that would be acceptable in a wilderness area were in line with the results of the questionnaire survey, where participants were asked what type of infrastructure may be present in the area for it to be considered wilderness. Over half of the respondents of the survey stated that no built structures should be present in a wilderness area (Figure 5). However, 78% of the respondents perceived trails made by hikers and animals as suitable in wilderness areas, and almost 63% thought that mountain huts would not spoil a wilderness experience. Fences and tracks made by vehicles were perceived as acceptable by less than half of the respondents. None of the respondents identified power plants as suitable infrastructure in wilderness areas, and other not acceptable types of infrastructure included hotels, reservoirs, roads, power lines, radio masts, and wind turbines.

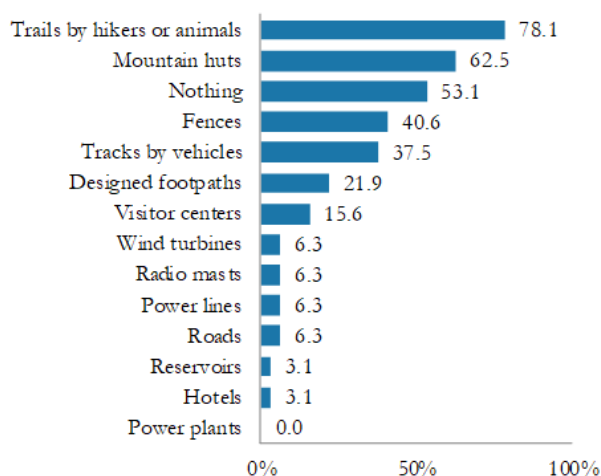
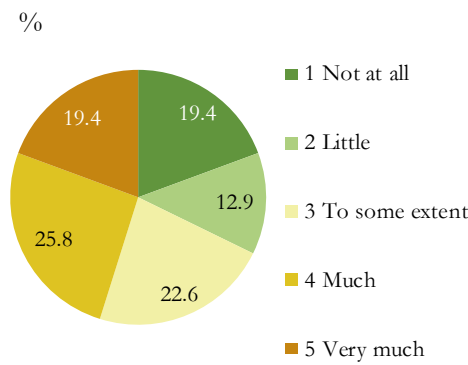


Figure 5. Attributes that may be present in a wilderness.

Respondents’ opinions regarding the effects of the built structures that they knew of, but could not see, on their wilderness experience were nonhomogeneous (Figure 6). While around 45% of the participants stated that their wilderness experience would be strongly affected by the infrastructure they knew of, but could not see, 32% said that their wilderness experience would be little or not at all affected by such infrastructure. Around 23% of the participants would be affected to some extent.

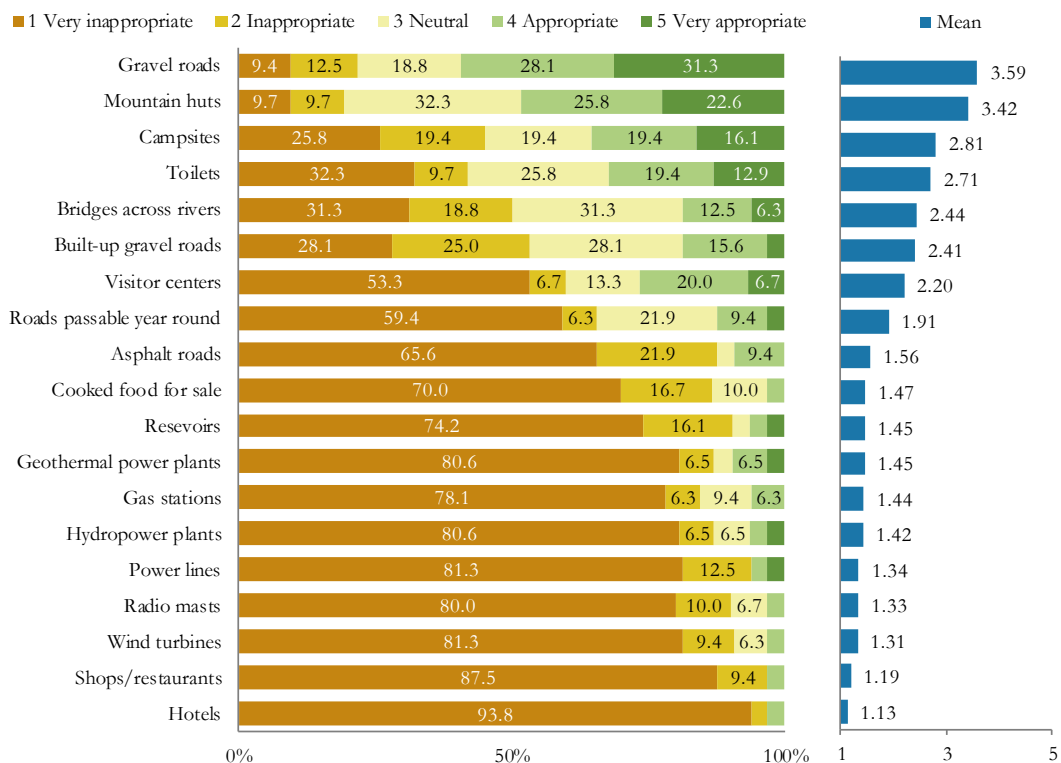




**Figure 6.** The extent of the effects of nearby structures visitors knew of, but could not see, on their wilderness experience.

5.4. Visitor Attitudes toward Built Structures in the Area

The answers to the question focusing on the suitability of various built structures in the study area revealed that most types of infrastructure were perceived by the visitors as not appropriate (Figure 7). While gravel roads, mountain huts, campsites, and toilets had higher acceptability among the participants of the questionnaire survey, the vast majority of the participants (94%) perceived hotels as inappropriate, and almost 88% of the respondents stated that shops and restaurants were inappropriate. Other human-made structures perceived as not suitable in the area included wind turbines, radio masts, power lines, hydropower plants, gas stations, geothermal power plants, reservoirs, service facilities selling cooked food, and asphalt roads.



**Figure 7.** Visitor opinions on appropriate infrastructure and services in the area.

An analysis of the interviews revealed several reasons for the perceived low suitability of infrastructure in the study area. The reason mentioned the most was that visitors coming to the area seek natural settings. Participant 1 stated the following:

For the trek I am doing right now I wouldn't add anything, because it is really that you are bringing your own equipment, that was kind of things I was looking for . . . so I wouldn't do anything else. Could there be some infrastructure for some other kind of activities? Why not, but this part should be preserved so that we can continue to have such trek not seeing any impacts, that could be visible in another region. I think it's quite rare to find such place in a European country.

This was supported by many, for example, by participant 3, who emphasized the importance of keeping certain wilderness areas undeveloped in order to provide recreation opportunities for the most purist visitors: "There are plenty of other options on the planet already, there are far less options for people looking for no structures than for kept trails, I wouldn't feel guilty [if the area would remain undeveloped]." The same interviewee added, "I think the wild areas like this one are fewer and fewer on the planet. So, it is precious to preserve them." As pointed out by participant 11, the component of challenge would be lost if infrastructure such as bridges were built in the area: "I prefer to wade a river rather than to walk across a bridge." Participant 14 emphasized that even the areas with currently low levels of use should be protected from development due to their intrinsic value: "I would leave it as it is, definitely leave it, because I think we need sort of wilderness even if nobody experiences it, I think we need it anyway."

Some of the interviewees were positive toward infrastructure, but on a low scale. Various reasons for this support were mentioned by the interviewees. First, tourist infrastructure would help reduce the negative environmental impacts of visitors if the level of recreational use in the area increased: "A mountain hut and a toilet would reduce the impact of people, so that would be a thing." Second, tourist infrastructure would increase the level of comfort, which might be relevant especially during bad weather. As participant 4 stated on a rainy and chilly evening during the backpacking tour: "I think I would rather stay in a mountain hut tonight." A few pointed out that increased infrastructure would enable people who are not able or not willing to participate in multiday backpacking tours to visit the area: "A lot of those people would love to come here, but they can't because they don't want to camp or can't camp or they can't hike a trail or can't read a map, and that shouldn't be denied."

However, even the interviewees supporting the development of some primitive tourist infrastructure in the area were very aware that such infrastructure might have negative effects on a wilderness experience and therefore should be planned very carefully. Participant 2 emphasized the following:

They need to keep in mind the wilderness and make it a blend, so that they don't disrupt the beauty and the wilderness that's here, but certainly if you bring more people in, you do have to think about toilets, you need to think about huts and those type of things, but making sure that it's used correctly, and the people are mindful of how they utilize the system so that the beauty remains and is not destroyed. In the U.S. they allowed it to happen and then had to fix it. It would be nice to do it correctly from the beginning, then you don't have problems that arise from too many people coming into an area.

The interviewees also pointed out that Icelandic ecosystems are very fragile, and a lot of time is needed for them to recover from any human damage; therefore, it is of high importance to protect natural areas from overdevelopment and overcrowding and from exceeding their carrying capacity:

If you develop this up, then you are going to run a risk of damaging. This environment does not repair itself. Nothing grows here, so I would say you don't want any infrastructure in this environment here. If you put in trails someone will say: if you have a trail it will help to preserve the environment, people just wouldn't wander all over the place, but trails will have more people, right now you don't have a lot of people coming through here.

### 5.5. Visitor Attitudes toward Renewable Energy Infrastructure

One of the questions in the questionnaire was about the suitability of renewable energy infrastructure in the central highlands of Iceland compared to the lowlands. The respondents viewed all energy development as more positive in the Icelandic lowlands compared to the highlands (Figure 8). The attitudes of the participants were the most negative toward the further construction of power lines and reservoirs in the central highlands and slightly less negative toward the development of geothermal and hydropower plants as well as the construction of wind farms in the highlands. Although energy development was perceived as more positive in the Icelandic lowlands, the acceptability of such projects was still relatively low: 72% of respondents stated that their attitudes toward the further construction of power lines in the lowlands were very or somewhat negative, 66% had negative attitudes toward reservoirs in the lowlands, and 56% had negative attitudes toward further hydropower development in the lowlands of the country. The attitudes were less negative about the further development of geothermal power plants in the lowland areas and the least negative about wind farms in the lowlands.

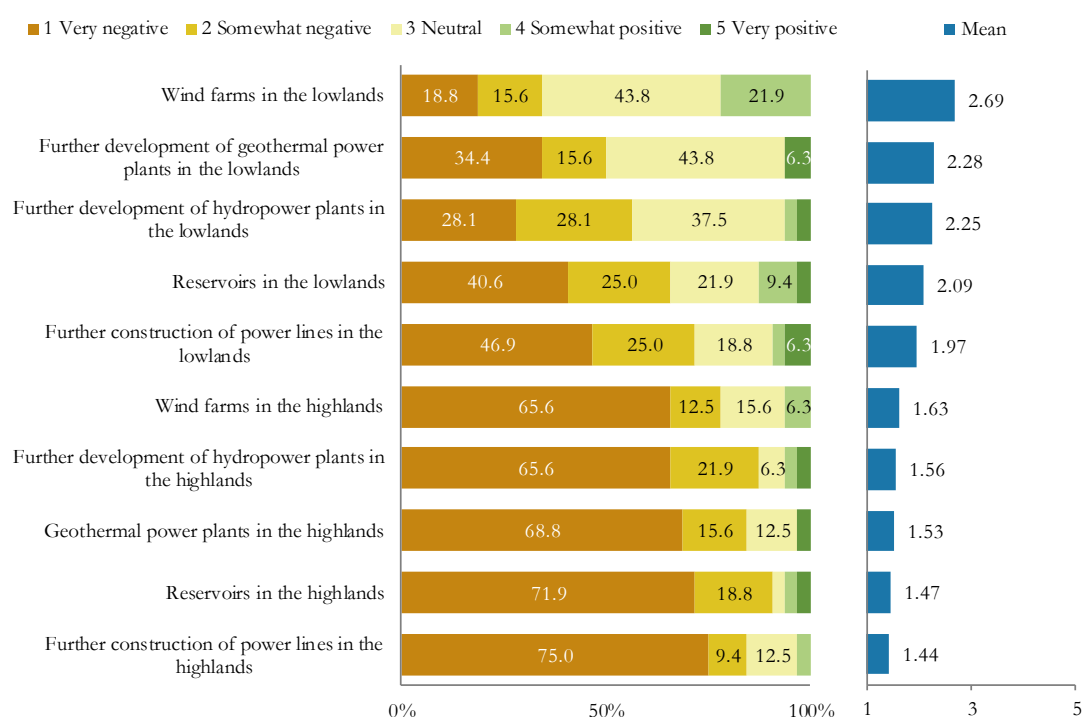
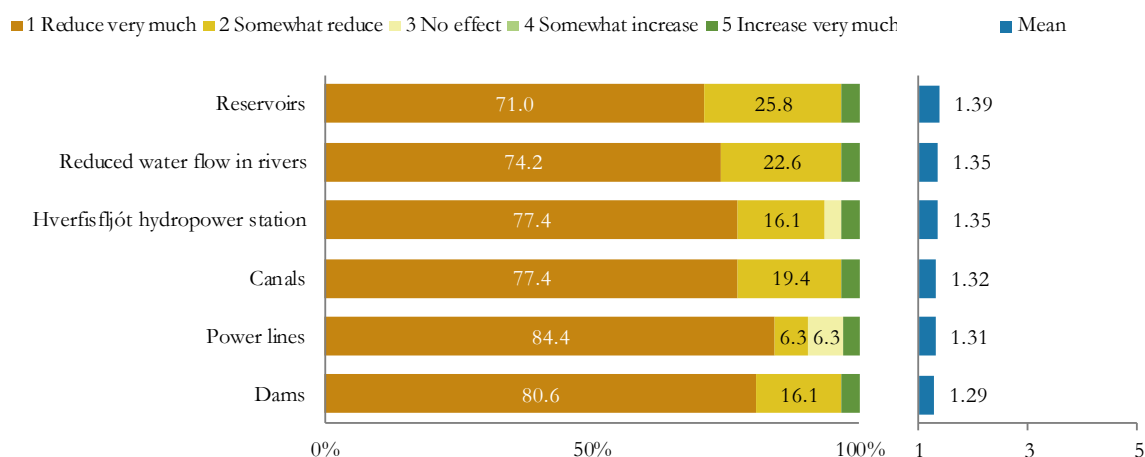


Figure 8. Visitors’ attitudes toward further power infrastructure development.

The participants were asked how infrastructure related to the proposed Hverfisfljót hydropower plant would affect their interest in visiting the area. Over 90% of the respondents stated that all the infrastructure accompanying the proposed power plant would strongly or somewhat reduce their interest in visiting the area (Figure 9). The infrastructure with the highest negative effects included dams, power lines, and canals, followed by power stations and reduced water flow in rivers and reservoirs.



**Figure 9.** The impact of the Hverfisfljót power plant's infrastructure on visitors' interest in visiting the area.

An analysis of the interviews revealed that the proposed Hverfisfljót hydropower plant would ruin the interviewees' experience in the area by impacting the surrounding landscapes:

At the moment it is untouched, the only thing we see is our own footprints and they go with the rain after a couple of days. So, you would be walking through such an unspoiled place to find a big dam, powerlines coming from it, it would absolutely ruin it.

Moreover, as pointed out by participant 11, the negative environmental impacts of such a power plant might be higher than expected since building a power plant would start a chain of changes in the surrounding ecosystems:

I think that this project would be destructive to the nature. The problem with a project like this is that we don't think about the long-term consequences, about the infrastructure, and the effects on the natural evolution of the lake and how everything is connected, all the ecosystems are connected. If you affect one, it will have an impact on another. ... It is all interconnected in the long term, and it is important to resist the outsiders' financial powers that push for investments in projects like that.

According to the interviewees, such unspoiled wilderness areas, which are becoming scarcer worldwide, should be preserved and protected from energy development:

I'm not from here, I just think, if you have a little bit of nature, save it as best as you can, ... but I understand if people have to work and have a living, but nature is just so, they are not building any more of it. I would just hate for the nature you guys already have, the environment, to get smaller, to be ruined.

Therefore, renewable energy infrastructure should be built in already developed areas of lower environmental value:

For me from what I saw yesterday, there must be other places that are already built up that could have a power plant near the city or some of the smaller villages, but when it's a whole natural area with nothing in it, I don't think there is any need to build.

The interviewees, however, emphasized that their opinions on the topic were very subjective since they lacked knowledge about the needs of local communities and the potential benefits of such power plant projects:



If you ask us as tourists, we definitely say we don't want to have the plant, we don't want to have the dams, we don't want to have the reservoirs, but we don't have enough information to evaluate why they are considering this construction, what will be the major advantage of having this.

The answers to the question about whether the interviewees would visit the area if the proposed hydropower plant were built were very diverse. Some interviewees would still visit the area. Participant 14 stated the following:

I don't think it would change my mind, but it would be just spoiled by having man-made things, by the construction in the places where there is nothing at the moment. I don't think it would change my mind though.

To others a trip to the area would become a lower priority, and they might choose to visit what they regard as a more natural area instead: "One of the reasons why we have chosen this trek is that we knew that it would have been in a remote region, so maybe it would have not been on the top of the list." A few interviewees would do more research about the invasiveness of the proposed power plant and its effects on the experiences of previous visitors: "We would probably read the reviews what others said, we would be looking at how it affected their trip, and maybe we could still see what we have seen in this trip and still have the wilderness . . ." And some of the interviewees would not visit the area at all: "No, not if I could go somewhere else that's totally natural."

## 6. Discussion

### 6.1. The Study Area as Perceived by Visitors

The area around the proposed Hverfisfljót hydropower plant stands out due to its limited accessibility and therefore is characterized by pristine nature, very low visitation, and primitive settings. Consequently, it is currently visited by a small number of people who prefer recreation in unspoiled nature, peace and quiet, a low level of infrastructure, and no human impacts. The results of the study reveal that those visiting the area sought environmental qualities that were in line with the components of the wilderness experience identified by Sæþórsdóttir [16], namely, unspoiled beautiful nature, escapism, solitude and companionship, challenge, and a spiritual experience. High levels of visitor satisfaction with their stay and with the nature in the area show that visitor expectations were met, and the area provided opportunities to experience wilderness, which was identified by visitors as an important part of the attraction of the area. Moreover, the characteristics of the area identified by visitors as the most fascinating were closely related to wilderness characteristics [53,54]. Next to the diverse landscapes, visitors were fascinated by the vast natural areas unmodified by human activity and by the opportunity not to meet any other people for days.

According to the participants, to be perceived as wilderness, a natural area should contain no human impacts, retain a low level of use, and have limited infrastructure. For most visitors, trails made by hikers or animals and mountain huts were acceptable in wilderness areas, while other built structures were perceived as rather unsuitable. Interestingly, visitor opinions regarding effects on wilderness experience of the built structures that existed in the area but could not be seen were very diverse. Such results support studies emphasizing that the visual impacts of various infrastructure elements are one of the most important aspects that must be taken into consideration during infrastructure planning [41,42]. The results are in line with Kyle and Chick [29] (p. 214), who suggested that "the meanings people associate with the physical landscape are the product of interactional processes involving the individual, the setting and their social worlds". However, while in the settings analyzed by Kyle and Chick [29] the sociocultural context was of high importance, the present study shows that in natural areas, the perceived physical characteristics of the area play a crucial role in the process of assigning place meanings to landscape. Wilderness areas without built structures are regarded as very valuable settings that should be protected from environmental degradation. Meanwhile, more

developed areas are perceived as more suitable for further infrastructure development, including renewable energy infrastructure, which is supported by Sæþórsdóttir and Hall [59].

The results further show that people have a preconceived image of wilderness areas as places that allow for unique experiences that are totally different from daily life. They choose recreation in such areas to escape from daily problems and responsibilities, recharge, immerse themselves in nature, and test their physical and psychological limits. This preconceived image of wilderness areas, however, seems to be in harmony with the actual visitor experience. Visitor descriptions of their expectations blended with their actual impressions and experiences in the study area, showing that it does indeed provide the expected environmental qualities to its visitors. Through unique experiences in wilderness areas, visitors tend to realize the importance of keeping such areas intact. Preserving wilderness areas seems to be especially important in light of continuous infrastructure development and a decrease in wilderness areas worldwide, which places wilderness areas further away from populated areas, and therefore reaching them requires more effort.

### *6.2. Hydropower Infrastructure and Tourism in a Wilderness Landscape*

Due to the multiple impacts of hydropower infrastructure on its surrounding environment and especially due to its visual impacts, the construction of such infrastructure might strongly affect the visitor experience. As pointed out by Bevk and Golobič [81], renewable energy development is likely to add new meanings to a landscape. Therefore, when planning the construction of a hydropower plant in areas with significant landscape value, it is important to evaluate how compatible these meanings would be with the current image and perceptions of the area and how the current meanings and values ascribed to the area will be affected by the construction of such infrastructure. The present study shows low compatibility between large-scale hydropower infrastructure and the wilderness landscape from the perspective of visitors. They would prefer to protect the area from any infrastructure development and see renewable energy development as more suitable in areas that are already developed. Such suggestions are in line with the criteria of best practices in renewable energy development proposed by various researchers [82,83], which, among other factors, emphasize that energy infrastructure should be built in already environmentally degraded areas or landscapes of no special value, where some infrastructure that could be used by the energy sector already exists and where energy infrastructure would not lead to land use conflicts. Importantly, landscape changes caused by hydropower development are long-term, and they are very hard or even impossible to reverse. Therefore, in cases where renewable energy infrastructure would reduce the current value of an area to its users as well as its future potential, other areas more suitable for such projects should be considered. Moreover, the sustainability of the design and the visual characteristics of the power plant should be taken into consideration [83]. While large-scale hydropower plants can have high negative effects on the environment and landscape, medium or small-scale plants might be easier to blend into the surrounding environment and might have higher stakeholder support [84].

Icelandic landscapes that are of high value for nature-based tourism but also contain abundant renewable energy resources point to the need for comprehensive national energy and conservation policies, which could be essential in solving conflicts related to renewable energy development [85]. When choosing the most suitable areas for renewable energy development, the landscape character—which, as pointed out by Bevk and Golobič [81], includes physical settings, the evolution of the area, and the perceptions and values ascribed to the landscape—should be taken into consideration together with the type of tourism that is best suited to the character of the area as well as broader development goals. Since nature-based tourism, which strongly relies on wilderness areas, is currently one of the most important industry sectors in Iceland, the development of such areas should be carefully planned, taking into consideration what tourism opportunities the country aims to provide long-term, what market segments would be the most beneficial for the country, and what environmental settings should be kept intact in order to ensure the high satisfaction of these market segments.

## 7. Conclusions

The study revealed that, currently, the area provides recreation opportunities for tourists who prefer pristine nature, natural settings, and minimal human impact. Visitors perceive the area around the Hverfisfljót River as a wilderness area and seek environmental settings closely related to the components of a wilderness experience. According to the visitors, the study area provides opportunities for unique experiences away from daily demands and worries. It gives tourists an opportunity to disconnect, immerse in nature, recharge, and challenge themselves in an environment that is completely different from their daily life. Therefore, visitors see the need to protect the study area as well as other wilderness areas from development. Next to the recreational opportunities that wilderness areas provide, the participants also emphasized that such areas should be protected due to their intrinsic value.

The majority of tourists stated that the proposed Hverfisfljót hydropower plant would strongly reduce their interest in visiting the area. With regard to specific power plant infrastructure elements, the visitors' attitudes were the most negative toward dams and power lines. Furthermore, the Icelandic lowlands, which are more developed, were perceived by the study participants as more suitable for renewable energy development. The present study shows that the proposed hydropower plant would destroy the wilderness experience, which currently is an essential part of the attraction of the area. With wilderness areas decreasing worldwide [86], it is of crucial importance to ensure that the use of resources in such areas does not degrade their wilderness quality. In cases where such degradation is likely, moving the project to a more suitable location of lower scenic value should be considered.

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## References

1. UN General Assembly. *Transforming our World: The 2030 Agenda for Sustainable Development A/RES/70/1*; United Nations: New York, NY, USA, 2015.
2. REN21. *Renewables 2019 Global Status Report*; REN21 Secretariat: Paris, France, 2019.
3. Gibson, L.; Wilman, E.N.; Laurance, W.F. How green is 'green' energy? *Trends Ecol. Evol.* **2017**, *32*, 922–935. [[CrossRef](#)] [[PubMed](#)]
4. Zarfl, C.; Lumsdon, A.E.; Berlekamp, J.; Tydecks, L.; Tockner, K. A global boom in hydropower dam construction. *Aquat. Sci.* **2015**, *77*, 161–170. [[CrossRef](#)]
5. Ranzani, A.; Bonato, M.; Patro, E.R.; Gaudard, L.; de Michele, C. Hydropower future: Between climate change, renewable deployment, carbon and fuel prices. *Water* **2018**, *10*, 1197. [[CrossRef](#)]
6. Killingtveit, Å. Hydropower. In *Managing Global Warming*; Letcher, T.M., Ed.; Academic Press: London, UK, 2019; pp. 265–315.
7. da Luz, T.; Moura, P. Power generation expansion planning with complementarity between renewable sources and regions for 100% renewable energy systems. *Int. Trans. Electr. Energy Syst.* **2019**, *29*, e2817. [[CrossRef](#)]
8. International Hydropower Association (IHA). *2018 Hydropower Status Report: Sector Trends and Insights*; Hydropower Association: London, UK, 2018.

9. Bruckner, T.; Bashmakov, I.A.; Mulugetta, Y.; Chum, H.; de la Navarro, A.V.; Edmonds, J.; Faaij, A.; Fungtammasan, B.; Zhang, X.; Honnery, D.; et al. Energy systems. In *Mitigation of Climate Change. Contribution of Working Group III to the Fifth Assessment Report of the Intergovernmental Panel on Climate Change*; Edenhofer, O., Pichs-Madruga, R., Sokona, Y., Farahani, E., Kadner, S., Seyboth, K., Adler, A., Baum, I., Brunner, S., Eickemeier, P., et al., Eds.; Cambridge University Press: Cambridge, UK, 2014.
10. Chen, S.; Chen, B.; Fath, B.D. Assessing the cumulative environmental impact of hydropower construction on river systems based on energy network model. *Renew. Sustain. Energy Rev.* **2015**, *42*, 78–92. [[CrossRef](#)]
11. Abbasi, S.A.; Abbasi, N. The likely adverse environmental impacts of renewable energy sources. *Appl. Energy* **2000**, *65*, 121–144. [[CrossRef](#)]
12. VanZwieten, J.; McAnally, W.; Ahmad, J.; Davis, T.; Martin, J.; Bevelhimer, M.; Cribbs, A.; Lippert, R.; Hudon, T.; Trudeau, M. In-stream hydrokinetic power: Review and appraisal. *J. Energy Eng.* **2015**, *141*, 04014024. [[CrossRef](#)]
13. Moran, E.F.; Lopez, M.C.; Moore, N.; Müller, N.; Hyndman, D.W. Sustainable hydropower in the 21st century. *Proc. Natl. Acad. Sci. USA* **2018**, *115*, 11891–11898. [[CrossRef](#)]
14. Botelho, A.; Ferreira, P.; Lima, F.; Pinto, L.M.C.; Sousa, S. Assessment of the environmental impacts associated with hydropower. *Renew. Sustain. Energy Rev.* **2017**, *70*, 896–904. [[CrossRef](#)]
15. Stefánsson, Þ.; Sæþórsdóttir, A.D.; Hall, C.M. When tourists meet transmission lines: The effects of electric transmission lines on tourism in Iceland. *Energy Res. Soc. Sci.* **2017**, *34*, 82–92. [[CrossRef](#)]
16. Sæþórsdóttir, A.D. Tourism struggling as the Icelandic wilderness is developed. *Scand. J. Hosp. Tour.* **2010**, *10*, 334–357. [[CrossRef](#)]
17. Sæþórsdóttir, A.D. Preserving wilderness at an emerging tourist destination. *J. Manag. Sustain.* **2014**, *4*, 65–78. [[CrossRef](#)]
18. National Energy Authority (NEA). OS-2019-T006-01: *Installed Capacity and Electricity Production in Icelandic Power Stations in 2018*; National Energy Authority: Reykjavik, Iceland, 2019.
19. Ministry for the Environment and Natural Resources. The current Master Plan. Parliamentary Resolution on the Plan for Nature Protection and Energy Utilisation. Available online: <http://www.ramma.is/english/the-master-plan-today/current-master-plan/> (accessed on 9 September 2019).
20. Sæþórsdóttir, A.D.; Tverijonaite, E.; Ólafsdóttir, R. *Attitudes of Tourists and the Tourism Industry towards the Proposed Hydro Power Plant in Hverfisfljót River in Skaftárhreppur*; Institute of Life and Environmental Sciences, University of Iceland: Reykjavik, Iceland, 2019. Available online: [http://www.ramma.is/media/rannsoknir/Hverfisfljot\\_Report\\_final.pdf](http://www.ramma.is/media/rannsoknir/Hverfisfljot_Report_final.pdf) (accessed on 9 September 2019).
21. Husserl, E. *Logical Investigations*; Humanities Press: New York, NY, USA, 1970.
22. Pereira, A.P.C.; Long, J. The social dynamics of space constructions and leisure lifestyles. In *Landscapes of Leisure. Space, Place and Identities*; Gammon, S., Elkington, S., Eds.; Palgrave Macmillan: London, UK, 2015; pp. 41–54.
23. Bauman, Z.; May, T. *Thinking Sociologically*; Blackwell: Maldon, MA, USA, 2001.
24. Hutson, G.; Howard, R. Weaving place meanings into outdoor recreation sustainability: The case of the Niagara Glen. In *Landscapes of Leisure. Space, Place and Identities*; Gammon, S., Elkington, S., Eds.; Palgrave Macmillan: London, UK, 2015; pp. 176–191.
25. Smale, B. Critical perspectives on place in leisure research. *Leisure/Loisir* **2006**, *30*, 369–382. [[CrossRef](#)]
26. Tuan, Y.-F. *Space and Place: The Perspective of Experience*; University of Minnesota Press: Minneapolis, MN, USA, 1977.
27. Stedman, R.C. Is it really just a social construction? The contribution of the physical environment to sense of place. *Soc. Nat. Resour.* **2003**, *16*, 671–685. [[CrossRef](#)]
28. Manzo, L.C. For better or worse: Exploring multiple dimensions of place meaning. *J. Environ. Psychol.* **2005**, *25*, 67–86. [[CrossRef](#)]
29. Kyle, G.; Chick, G. The social construction of a sense of place. *Leis. Sci.* **2007**, *29*, 209–225. [[CrossRef](#)]
30. Cheng, A.S.; Kruger, L.E.; Daniels, S.E. “Place” as an integrating concept in natural resource politics: Propositions for a social science research agenda. *Soc. Nat. Resour.* **2003**, *16*, 87–104. [[CrossRef](#)]
31. Duncan, J.S.; Duncan, N.G. The aestheticization of the politics of landscape preservation. *Ann. Assoc. Am. Geogr.* **2001**, *91*, 387–409. [[CrossRef](#)]
32. Greider, T.; Garkovich, L. Landscapes: The social construction of nature and the environment. *Rural Sociol.* **1994**, *59*, 1–24. [[CrossRef](#)]



33. Knudsen, D.C.; Metro-Roland, M.M.; Soper, A.K.; Greer, C. Landscape, tourism, and meaning: A conclusion. In *Landscape, Tourism, and Meaning*; Knudsen, D.C., Metro-Roland, M.M., Soper, A.K., Greer, C.E., Eds.; Ashgate Publishing Limited: Hampshire, UK, 2008; pp. 131–134.
34. Eisenhauer, B.W.; Krannich, R.S.; Blahna, D.J. Attachments to special places on public lands: An analysis of activities, reason for attachments, and community connections. *Soc. Nat. Resour.* **2000**, *13*, 421–441. [[CrossRef](#)]
35. Davenport, M.A.; Anderson, D.H. Getting from sense of place to place-based management: An interpretive investigation of place meanings and perceptions of landscape change. *Soc. Nat. Resour.* **2005**, *18*, 625–641. [[CrossRef](#)]
36. Devine-Wright, P.; Howes, Y. Disruption to place attachment and the protection of restorative environments: A wind energy case study. *J. Environ. Psychol.* **2010**, *30*, 271–280. [[CrossRef](#)]
37. Devine-Wright, P. Rethinking NIMBYism: The role of place attachment and place identity in explaining place-protective action. *J. Community Appl. Soc. Psychol.* **2009**, *19*, 426–441. [[CrossRef](#)]
38. Kil, N.; Stein, T.V.; Holland, S.M.; Anderson, D.H. Understanding place meanings in planning and managing the wildland–urban interface: The case of Florida trail hikers. *Landsc. Urban Plan.* **2012**, *107*, 370–379. [[CrossRef](#)]
39. Council of Europe. *European Landscape Convention*; CETS No. 176; Council of Europe: Strasbourg, France, 2000.
40. Kühne, O. *Landscape and Power in Geographical Space as a Social-Aesthetic Construct*; Springer International Publishing: Dordrecht, The Netherlands, 2018.
41. Smardon, R.; Pasqualetti, M.J. Social acceptance of renewable energy landscapes. In *The Renewable Energy Landscape: Preserving Scenic Values in our Sustainable Future*; Apostol, D., Palmer, J., Pasqualetti, M., Smardon, R., Sullivan, R., Eds.; Routledge: New York, NY, USA, 2017; pp. 108–142.
42. Pröbstl, U.; Jiricka, A.; Hindinger, F. Renewable energy in winter sports destinations—Desired, ignored or rejected? In *Managing Alpine Future II: Inspire and Drive Sustainable Mountain Regions*; Borsdorf, A., Stötter, J., Veuillet, E., Eds.; Austrian Academy of Sciences Press: Vienna, Austria, 2011; pp. 309–318.
43. Haggett, C. Understanding public responses to offshore wind power. *Energy Policy* **2011**, *39*, 503–510. [[CrossRef](#)]
44. Johansson, M.; Laike, T. Intention to respond to local wind turbines: The role of attitudes and visual perception. *Wind Energy* **2007**, *10*, 435–451. [[CrossRef](#)]
45. Pasqualetti, M.J.; Gipe, P.; Richter, R.W. *Wind Power in View: Energy Landscapes in a Crowded World*; Academic Press: New York, NY, USA, 2002.
46. Wolsink, M. Wind power implementation: The nature of public attitudes: Equity and fairness instead of ‘backyard motives’. *Renew. Sustain. Energy Rev.* **2007**, *11*, 1188–1207. [[CrossRef](#)]
47. Wolsink, M. Near-shore wind power—Protected seascapes, environmentalists’ attitudes, and the technocratic planning perspective. *Land Use Policy* **2010**, *27*, 195–203. [[CrossRef](#)]
48. Frantál, B.; Kunc, J. Wind turbines in tourism landscapes: Czech experience. *Ann. Tour. Res.* **2011**, *38*, 499–519. [[CrossRef](#)]
49. Lilley, M.B.; Firestone, J.; Kempton, W. The effect of wind power installations on coastal tourism. *Energies* **2010**, *3*, 1–22. [[CrossRef](#)]
50. Broekel, T.; Alfken, C. Gone with the wind? The impact of wind turbines on tourism demand. *Energy Policy* **2015**, *86*, 506–519. [[CrossRef](#)]
51. Frantál, B.; Urbánková, R. Energy tourism: An emerging field of study. *Curr. Issues Tour.* **2017**, *20*, 1395–1412. [[CrossRef](#)]
52. Gailing, L.; Leibenath, M. The social construction of landscapes: Two theoretical lenses and their empirical applications. *Landsc. Res.* **2015**, *40*, 123–138. [[CrossRef](#)]
53. Hall, T.E. Hikers’ perspectives on solitude and wilderness. *Int. J. Wilderness* **2001**, *7*, 20–24.
54. Cole, D.N.; Hall, T.E. *Wilderness Visitors, Experiences, and Management Preferences: How They Vary with Use Level and Length of Stay*; Rocky Mountain Research Station, Forest Service, U.S. Department of Agriculture: Fort Collins, CO, USA, 2008. Available online: [https://www.fs.fed.us/rm/pubs/rmrs\\_rp071.pdf](https://www.fs.fed.us/rm/pubs/rmrs_rp071.pdf) (accessed on 9 September 2019).
55. Sæþórsdóttir, A.D. Managing popularity: Changes in tourist attitudes in a wilderness destination. *Tour. Manag. Perspect.* **2013**, *7*, 47–58. [[CrossRef](#)]

56. Ólafsdóttir, R.; Sæþórsdóttir, A.D.; Runnström, M. Purism scale approach for wilderness mapping in Iceland. In *Mapping Wilderness: Spatial Methods and Applications in Mapping and Modelling Wild Landscapes*; Carver, S.J., Fritz, S., Eds.; Springer: London, UK, 2015.
57. Sæþórsdóttir, A.D.; Ólafsdóttir, R.; Smith, D. Turbulent times: tourists' attitudes towards wind turbines in the Southern Highlands in Iceland. *Int. J. Sustain. Energy* **2018**, *37*, 886–901. [[CrossRef](#)]
58. Sæþórsdóttir, A.D.; Saarinen, J. Challenges due to changing ideas of natural resources: Tourism and power plant development in the Icelandic wilderness. *Polar Rec.* **2016**, *52*, 82–91. [[CrossRef](#)]
59. Sæþórsdóttir, A.D.; Hall, C.M. Floating away: The impact of hydroelectric power stations on tourists' experience in Iceland. *Sustainability* **2018**, *10*, 2315. [[CrossRef](#)]
60. National Land Survey of Iceland (NLSI). IS50v Geodatabase, Municipalities [IS50V\_MORK\_17062018\_ISN2004] (data updated 17th June 2018). 2018. Available online: <http://atlas.lmi.is/LmiData/index.php?id=1805547497832> (accessed on 18 October 2019).
61. Statistics Iceland. Municipalities and Urban Nuclei. 2019. Available online: <https://www.statice.is/statistics/population/inhabitants/municipalities-and-urban-nuclei/> (accessed on 9 September 2019).
62. Sæþórsdóttir, A.D.; Stefánsson, Þ. Ferðapjónusta og virkjanir til bjargar byggðum? Can tourism and power plants aid rural communities? *Tímarit Um Viðskipti Og Efnahagsmál* **2017**, *14*. [[CrossRef](#)]
63. Þórhallsdóttir, G.; Ólafsson, R. *Fjöldi Gesta í Vatnajökulshjóljóðgarði frá Upphafi Talninga út Árið 2017 (Number of Visitors to Vatnajökull National Park from the Beginning of Record-Keeping Until 2017)*; Vatnajökull National Park: Reykjavík, Iceland, 2018.
64. Thordarson, T.; Self, S. The Laki (Skaftár Fires) and Grímsvötn eruptions in 1783–1785. *Bull. Volcanol.* **1993**, *55*, 233–263. [[CrossRef](#)]
65. Kiernan, K.; Wood, C.; Middleton, G. Aquifer structure and contamination risk in lava flows: Insights from Iceland and Australia. *Environ. Geol.* **2003**, *43*, 852–865. [[CrossRef](#)]
66. National Energy Authority (NEA). R3115A Hverfisfljótsvirkjun. Viðauki 15 af 92 við Skýrslu Orkustofnunar OS-2015/04. *Virkjunarkostir til umfjöllunar í 3. áfanga rammaáætlunar*; National Energy Authority: Reykjavík, Iceland, 2015.
67. Booth, K.L. *Review of Visitor Research for the Department of Conservation*; Department of Conservation: Wellington, New Zealand, 2005.
68. Hall, C.M. (Ed.) *Fieldwork in Tourism: Methods, Issues and Reflections*; Routledge: Abington, UK, 2010.
69. Higham, J. Sustaining the physical and social dimensions of wilderness tourism: The perceptual approach to wilderness management in New Zealand. *J. Sustain. Tour.* **1998**, *6*, 26–51. [[CrossRef](#)]
70. Hall, C.M.; Ram, Y.; Shoval, N.E. *The Routledge International Handbook of Walking*; Routledge: Abingdon, UK, 2017.
71. Bryman, A. *Social Research Methods*, 5th ed.; Oxford University Press: New York, NY, USA, 2016.
72. Berg, B. (Ed.) A dramaturgical look at interviewing. In *Qualitative Research Methods for the Social Sciences*, 7th ed.; Pearson: London, UK, 2009; pp. 101–157.
73. Waller, V.; Farquharson, K.; Dempsey, D. *Qualitative Social Research: Contemporary Methods for the Digital Age*; SAGE Publications: London, UK, 2016.
74. Sheble, L.; Wildemuth, B.M. Research diaries. In *Applications of Social Research Methods to Questions in Information and Library Science*; Wildemuth, B.M., Ed.; Libraries Unlimited: Westport, CT, USA, 2009; pp. 211–221.
75. Kawulich, B.B. Participant observation as a data collection method. *Forum Qual. Soc. Res.* **2005**, *6*, art.43.
76. DeWalt, K.M.; DeWalt, B.R. *Participant Observation: A Guide for Fieldworkers*; Altamira: New York, NY, USA, 2002.
77. Creswell, J.W.; Poth, C.N. *Qualitative Inquiry and Research Design: Choosing Among Five Approaches*; Sage Publications: Thousand Oaks, CA, USA, 2017.
78. Prayag, G. Mixed methods in tourism: Philosophical assumptions and key research design issues. In *Handbook of Research Methods for Tourism and Hospitality Management*; Nunkoo, R., Ed.; Edward Elgar Publishing: Cheltenham, UK, 2018; p. 363.
79. Creswell, J.W. *Educational Research: Planning, Conducting, and Evaluating Quantitative and Qualitative Research*; Pearson/Merrill Prentice Hall: Upper Saddle River, NJ, USA, 2008.
80. Joffe, H. Thematic analysis. In *Qualitative Research Methods in Mental Health and Psychotherapy*; Harper, D., Thompson, A.R., Eds.; John Wiley & Sons: Oxford, UK, 2011; pp. 209–223.

81. Bevk, T.; Golobič, M. What fits where? Landscape approach to renewable energy development. In *Renewable Energy and Landscape Quality*; Roth, M., Eiter, S., Röhner, S., Kruse, A., Schmitz, S., Frantál, B., Centeri, C., Frolova, M., Buchecker, M., Stober, D., et al., Eds.; Jovis Verlag GmbH: Berlin, Germany, 2018; pp. 139–144.
82. Frantál, B.; van der Horst, D.; Martinát, S.; Schmitz, S.; Teschner, N.; Silva, L.; Golobic, M.; Roth, M. Developing renewables in crowded landscapes: In search of international smart practice. In *Renewable Energy and Landscape Quality*; Roth, M., Eiter, S., Röhner, S., Kruse, A., Schmitz, S., Frantál, B., Centeri, C., Frolova, M., Buchecker, M., Stober, D., et al., Eds.; Jovis Verlag GmbH: Berlin, Germany, 2018; pp. 145–151.
83. Apostol, D.; McCarty, J.; Sullivan, R. Improving the visual fit of renewable energy projects. In *The Renewable Energy Landscape: Preserving Scenic Values in our Sustainable Future*; Apostol, D., Palmer, J., Pasqualetti, M., Smardon, R., Sullivan, R., Eds.; Routledge: New York, NY, USA, 2017; pp. 176–197.
84. Miller, D. Transformations in European energy landscapes: Towards 2030 targets. In *Renewable Energy and Landscape Quality*; Roth, M., Eiter, S., Röhner, S., Kruse, A., Schmitz, S., Frantál, B., Centeri, C., Frolova, M., Buchecker, M., Stober, D., et al., Eds.; Jovis Verlag GmbH: Berlin, Germany, 2018; pp. 214–225.
85. Benediktsson, K.; Waage, E.R.H. Iceland. In *Renewable Energy and Landscape Quality*; Roth, M., Eiter, S., Röhner, S., Kruse, A., Schmitz, S., Frantál, B., Centeri, C., Frolova, M., Buchecker, M., Stober, D., et al., Eds.; Jovis Verlag GmbH: Berlin, Germany, 2018; pp. 48–51.
86. Watson, J.E.M.; Shanahan, D.F.; di Marco, M.; Allan, J.; Laurance, W.F.; Sanderson, E.W.; Mackey, B.; Venter, O. Catastrophic declines in wilderness areas undermine global environment targets. *Curr. Biol.* **2016**, *26*, 2929–2934. [[CrossRef](#)] [[PubMed](#)]



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