

Experiencing environmental changes in Vík, southern Iceland

CoastAdapt report



Ásdís Jónsdóttir

Institute for Sustainability Studies, University of Iceland

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INTRODUCTION

The people of Vík and surrounding areas live in a particularly unstable environment, being exposed to both natural disasters and relatively large natural fluctuations in both weather and climate. The aim of this report is to examine how the inhabitants of Vík perceive the rapid environmental changes of the past years and how they relate them to the viability of the community. The report asks whether and how the locals associate these changes to global climate change.

This report is a part of CoastAdapt, a transnational project that aims at developing and implementing a range of adaptation strategies and tools to enable people living in coastal communities to take action to deal with the impacts of climate change. Five pilot sites in the northern Atlantic region take part in the project: Árborg and Mýrdalshreppur (the municipality of Vík) in Iceland, Hammerfest in Norway, The Outer Hebrides in Scotland and Tralee Bay in Ireland.

Vík is a village of about 300 people on the southern coast of Iceland. It stands under one of the most hazardous and active volcanoes in Iceland, Katla. Katla is located under Mýrdalsjökull ice cap so eruptions cause immense glacier floods that flow down to sea in the vicinity of the village. The shore that most of the village is placed on is made from volcanic debris that was brought to the sea in past eruptions. This soil is highly erosive, and since there is an unusually long time since the last large eruption (in 1918), the coastline is retreating fast posing a threat to the village. Sea level rise is likely to increase the risk related to the erosion.

The situation in Vík, where the impacts of climate change on environmental risk are only marginal in relation to the risk posed by non-climate factors is not atypical around the world (Pielke et al., 2007). For many communities in different parts of the world, a rapidly changing social and natural environment seems more like business-as-usual, than a recent and climate-related fact. In a situation of ongoing changes with diverse and entangled causal sources, the question becomes: how do people explain these changes? Why do people begin to understand local processes as a part of a global picture? For most people, the notion of a global climate is abstract and removed from their immediate experience. As controversies about the existence of anthropogenic warming demonstrate, people do not relate environmental changes to global climate change simply because that is what is “correct” according to the sciences. Understanding the environment in terms of climate change is a social process, where people build on their experiences and local as well as global environmental knowledge. To local people then, “climate impacts” will never appear as a discrete category of changes.

This has implications for projects that aim to involve the public in climate change foresight, such as CoastAdapt. A focus on climate change may be less meaningful for people than a more general focus on ongoing socio-environmental changes. This report will show that whereas the concept “global climate change” was abstract and even irrelevant to many of the people, the ongoing changes due to warming, erosion and natural disasters were certainly not. The *framing* of public participation is therefore highly relevant. Framing public involvement in terms of the impacts of climate change directs attention towards expert knowledge, or at best (in the case of Vík at least) marginal changes in an already immensely dynamic environment. This may result in a marginalization of the local experiences and knowledge.

Further, it may not make sense to locals to isolate “natural” from “social” changes. Adaptation is never of a purely technical, environmental, social, economical or cultural nature. It is always a combination of these (Orlove, 2005). “Natural” disasters, for instance, are seldom solely of natural origin. Rather, they always involve specific mixes of nature and human action (Hastrup, 2009).

The term *community viability* attempts to bring together the environmental, social, political and cultural aspects of adaptation. According to Aarsæther et al (2004), a community is viable if “people feel that they can stay as inhabitants for a period of their lives, where they find sources of income and meaningful lives” (ibid: 139). Viability is thus closely knit to how people experience and view their community and its future. Aarsæther et al. discuss three main factors that relate to community viability in Arctic regions: a) strong networks (including infrastructures) reaching out of the community, to actors such as global markets and national governments, b) political organization that includes a strong culture of public debate and political accountability, and c) municipal self-governance allowing locals to influence public services and daily life. Although such socio-cultural factors are important, community viability is also likely to be influenced by more material factors, such as technology, the biosphere and geophysical conditions. This is evident in Vík where natural processes regularly intervene in social life in a particularly forceful way, as the report will show. In this report, it is argued that the way people perceive and understand environmental changes and the way the community reacts faced with the threat of natural hazards can have important implications for community viability.

VÍK IN MÝRDALUR

COMMUNITY AND NATURAL HAZARDS

Vík in Mýrdalur (picture 1) is situated in southern Iceland, approximately 200 km east of Reykjavík. There are around 300 inhabitants in the village, which is a part of the municipality of Mýrdalshreppur that also includes around 200 people living in neighboring farms. The population of Mýrdalshreppur has remained relatively stable in the past decades (Statistics Iceland, 2010).



Picture 1: Vík in Mýrdalur, southern Iceland. Photo: Natasha Onofrei.

The history of the village in Vík can be traced back to the late 19th century when a store was opened on the farm Suður-Vík to shorten the distance farmers had to travel to the nearest market (Sverrisson, 1995). Vík has since served as an important service center in southern Iceland. The coastline lies open to the North Atlantic Ocean and lacks natural harbors. Consequently fishing has never been a major source of income in Mýrdalur, although some fishing took place alongside farming (Guðmundsson, 1995). Today, most of the inhabitants are employed in the service sector, mainly in commerce, tourism and public services. Several small manufacturers, for example of textiles and carpentry, are also important for the local economy of Vík.

Vík is exposed to various natural hazards. It is situated under the volcano Katla, which is covered by the glacier Mýrdalsjökull. Katla is one of the country's most active volcanoes, erupting every 50 years or so (Soosalu

et al., 2006). The volcano is considered one of Iceland's most hazardous, partly because its proximity to inhabited areas increases its socio-economic effects. Katla's last eruption occurred in 1918 and it is now considered to be due to erupt. Jónsson et al. (2000) have evaluated the possible socio-economic effects of an eruption in Katla based on previous eruptions.

First, because of the contact between ice and lava, Katla eruptions are typically plinian. In plinian eruptions the hot lava comes into contact with the ice causing huge explosions that throw vast amounts of tephra into the air. In unfavorable wind directions, the tephra cloud can cover inhabited areas, completely blocking all light. Tephra can cause damage to infrastructure breaking roofs and blocking sewage systems. The tephra can cause problems for traffic both in the air and on the ground. Tephra may cover plants and destroy them although it may also act as fertilizer, depending on its composition and thickness (Karlsdóttir, 2010). Lightning that often accompanies volcanic eruptions present an additional threat and can be fatal to people and animals.

Second, toxic substances that the volcano emits can be hazardous to human and animal health. Third, because Katla melts the Mýrdalsjökull glacier, catastrophic glacial outburst floods accompany the eruptions. The flood that followed the 1918 eruption is estimated to have reached a peak discharge of over $300,000 \text{ m}^3\text{s}^{-1}$ which exceeds other melt water floods caused by volcanic eruptions on record (Bird, 2010). The floods can destroy roads and bridges and threaten certain farms. Moreover, the floods may damage vegetation. The flood comes with a few hours warning and evacuation plans are in place. When the water mass hits the ocean, it can produce a small tsunami that can threaten Vík and several other villages in southern Iceland (Jónsson et al., 2000).

Another active volcano near Vík is the glacier Eyjafjallajökull which erupted in the spring of 2010 (see picture 2). On March 20th 2010 a fissure opened on a popular hiking route between the two glaciers Eyjafjallajökull and Mýrdalsjökull. As the crater was not under ice, the eruption did not produce tephra or outburst floods. Around 700 people were evacuated from nearby areas but were allowed to return home on the following day (Jóhannesdóttir, 2010). The eruption lasted until April 13th. On the following day the eruption resumed slightly further to the west, now much more forceful and under the icecap, causing explosions as the lava melted the ice. Tephra and ash rose several kilometers into the atmosphere, leading to the closure of airspace in Europe for several days. The areas near the eruption, including Vík, were subjected to vast amounts of tephra. Again, around 700 people were evacuated (ibid).

Action plans following the eruption involved many different organizations such as the Red Cross, rescue teams, local health care

officials, Ministries, various local associations and the national church. Effort was put into taking care of the people and tending to their well-being, as well as saving their property. In October 2010, the Icelandic Civil Protection Department (ICP) issued a report with the aim of mapping the main lessons learned during the eruptions. One of the issues addressed in the report is the effect of the tephra on the health of people and animals. Many reported physical discomfort during the ash fall, including a burning sensation in the throat, difficulty breathing and fatigue. Some people interviewed by the ICP said they were surprised that the authorities had not put forth clear instructions on how to react to the tephra fall. People felt that there was a lack of information about the impact of tephra on people and animals (Icelandic Civil Protection Department, 2010). A study has been launched to further the understanding of the effects of tephra on health (Pétursdóttir, 2010).

In May 2011, there was another eruption in Grímsvötn volcano in Vatnajökull glacier that caused tephra fall in Vík. Although this was a relatively large eruption, Vatnajökull is further away from Vík than Eyjafjallajökull and therefore the impacts were less severe than in the case of Eyjafjallajökull.



Picture 2: Eruption in Eyjafjallajökull in the spring of 2010. Photo: Jónas Erlendsson.

Coastal erosion is another source of concern for the inhabitants of Vík. The coast south of Vík is a newly formed shore that most likely began to take shape in the 16th century following outburst floods from Mýrdalsjökull glacier (Fjarhitun, 1994). The coastline has extended and eroded in cycles related to the volcanic material emitted by Katla and to some extent by Grímsvötn volcano in Vatnajökull glacier (ibid). In 1970,

when the coast had reached its maximal extension after the 1918 eruption in Katla, it was around 500 meters further out than it had been in 1917. In the 1970s the coast began receding and has retreated more than 300 meters or on average 9 meters per year between 1971 and 2008 (Viggósson, 2009). Picture 3 shows the eroding shore south of the village.

At the turn of the 20th century the village grew rapidly and constructions began to rise on the sandy ground under the more solid hill slopes where the farmsteads were found. In 1915, around 20 houses had been built “on the sand”. Despite warnings from geologists who pointed out that the shore was not stable and suggested that the village expanded on the slopes rather than the newly formed lowlands, more houses were built there during the 20th century. Today, the sport facilities of the village lie closest to the coastline.

Expected sea level rise can further increase the erosion of the shore south of Vík. The average observed sea level rise in Iceland were in accordance to the world average of $1,8 \text{ mm} \pm 0,5 \text{ mm}$ per year between 1961 and 2003, as reported by the IPCC in 2007. However, the actual local sea level rise around Iceland is complicated by variable patterns of isostatic subsidence and rebound. Vík lies between the southwestern part of Iceland that is subsiding and the southeastern part that is rising. It is thought that Vík is near the zero-point, neither subsiding nor rising (Viggósson, 2010). Thus, it is possible that a rising sea level will have effects in Vík. The relationship between the erosion and sea level rise is further complicated by the fact that when Katla erupts again, emitting new material into the ocean, it is likely that the erosive process will be turned around and the coast will expand again. A rising sea level may of course intensify the natural cycles of erosion and expansion of the coast. Climate change may also have a slight marginal impact on the volcanic activity of Katla, as the frequency of eruptions is expected to increase slightly when the glacier load is relieved off the volcano (Pagli and Sigmundsson, 2008; Björnsson et al., 2008).

The effects of a warming climate have been observed on the Mýrdalsjökull glacier in the vicinity of Vík. Mýrdalsjökull's most accessible outlet glacier is Sólheimajökull, which retreated between 1930 and 1969, but began to advance in the early 70's. The period of advancement lasted until the mid 1990's, but since then the glacier has retreated fast (Sigurðsson, cited in Oddsson, 2004; Vísir, 2009).



Picture 3: The coastline south of Vík. Photo: ÁJ

PREVIOUS RESEARCH ON ENVIRONMENTAL PERCEPTION IN VÍK AND SURROUNDING AREAS

The volcano Katla has showed signs of unrest since 1999 and there are increased chances of an eruption in the coming years (Soosalu et al., 2006). Several studies have been conducted on the local people's perception of risk from an eruption in Katla (see: Bird, 2010; Bird et al., 2010; Bird et al., 2009a; Bird et al., 2009b; Jóhannesdóttir and Gísladóttir, 2010; Jóhannesdóttir, 2005).

Jóhannesdóttir and Gísladóttir (2010) conducted in-depth interviews with 28 people in Vík and the neighboring rural community of Álftaver. Álftaver is more vulnerable in case of an eruption than Vík, as it is placed in the pathway of the outburst flood. Vík is not in the pathway, but is at risk from being flooded by a tsunami formed as the outburst flood hits the sea. Therefore, they have a longer warning period than the residents of Álftaver. Another difference is that Álftaver is a farming community that bases its livelihood on animal farming and thus the residents felt less mobile than the residents of Vík, who mostly rely on services.

Jóhannesdóttir and Gísladóttir found that the general knowledge about the risk related to an eruption in Katla was good. Despite that, there was a lack of preparedness and mitigation efforts. People used different methods to minimize their fears. Some refrained from discussing the danger. Others emphasized the fact that despite frequent eruptions in

Iceland, there are rarely any casualties related to them. Many residents doubted that an eruption was to be expected, despite forecasts from scientists. Others, such as the local district commissioner, stressed the monitoring efforts of scientists and was confident that scientists would be able to forecast an eruption with enough precision to give plenty of time to evacuate.

Jóhannesdóttir and Gísladóttir suggest that increased local participation in planning responses and mitigation in case of an eruption is likely to increase the level of preparedness in the area. Moreover, efforts of communication between scientists, local administrators and the people should be strengthened.

Bird et al. (2010) come to similar conclusions in their research on perception of risk in Álftaver. They observed an evacuation exercise in the region and conducted face-to-face interviews with both the emergency management officials and the residents after the exercise. Although the residents of Álftaver proved to be well informed about the potential catastrophic impacts of an eruption from Katla, many of them expressed their discontent with the rescue plan. They felt that their knowledge of the flood pathway that had been handed to them through local oral history as well as written annals was not regarded as important. Further, many felt that the rescue plan did not take their need to tend to the animals into consideration, thus putting their livelihood at risk. Residents also mentioned that they feared the rescue plan neglected important risk factors such as tephra. Bird et al. conclude that a greater community participation in making risk mitigation plans should be encouraged and that local knowledge should be included to a greater extent.

METHODS

INTRODUCTION

This report is based on two focus groups conducted in Vík in July 2010 and six interviews conducted in 2009 and 2010. In both the interviews and the focus groups we attempted to minimize the expert and scientific framing of the focus group setting during the meeting. This was done in several ways. First, we avoided the use of scientific or expert jargon in the introduction as well as the discussion topics. Instead of using “global climate change” as the topic of the meeting we used the more general “environmental change”. This allowed us to explore empirically whether climate change was used as a local conceptual framework in understanding environmental change (we did ask about global climate

change, but only rather late in the discussion). Second, we kept the introduction short and in the case of the focus groups we did not include any presentations or talks by experts. Our aim was to emphasize that we wanted the locals to express their opinions and concerns in their own words and through their own knowledge, which did not necessarily have to be in line with the language of experts. Third, we attempted to keep the atmosphere and the setting as informal and relaxed as possible.

In the introduction to the discussion the participants were told that the aim was to talk about environmental changes and the near future of the community of Vík. They were told that this work was a part of the project CoastAdapt that aimed at connecting coastal communities by the North Atlantic, especially with the aim of sharing experiences and tools of adapting to a changing environment. This could be any type of environmental change, including natural disasters. As we wanted to refrain from framing the discussion in terms of climate change only, the term “climate change” was not used in the introduction.

THE FOCUS GROUPS

FOCUS GROUPS AS A METHOD

Focus groups are especially useful in exploring people’s experiences, views and concerns. Whereas polls can provide indicators of opinions and measure the frequency of certain behaviors or views, focus groups are more appropriate when exploring how people understand their social and natural environment. In particular, they can be helpful in investigating people’s perspectives and experiences concerning specific issues. Focus groups allow the participants to bring forth their own concepts and frames and express themselves in their own vocabulary (Kitzinger and Barbour, 1999).

Waterton and Wynne (1999) argue that focus groups are a more appropriate tool for accessing community views than opinion polls. They challenge the assumption found in opinion polls that community attitudes to risk (nuclear risk in their case) are stable. Their results indicate that people express themselves in relational manner, which makes it difficult to separate “opinions” into discrete categories freed of the context in which they are expressed. They take the example how joking and irony in the focus groups they conducted portrayed the participants’ feelings of marginality and powerlessness. Thus, although the participants’ statements taken at face value sounded like they

downplayed risks, an analysis of the irony gave a more complicated picture of the social status and the position of the participants.

Waterton and Wynne also point out that focus groups can offer a “snapshot of attitudes-in-the-making” (ibid: 142). Hence, they show how people develop their views interactively during discussions. The focus group allows the researcher to explore how people’s viewpoints are fluid and defined in relation to the responses of others. Moreover, the focus group can portray in what way the participants’ identities are flexible and how people constantly adjust the presentation of themselves to different situations. This challenges the premise of opinion polls that people have more or less fixed identities and opinions.

Lastly, Waterton and Wynne highlight the constructed nature of “community”. A collective sense of identity may be formed around experiences of risk. Thus, “risk” and “community” are unstable categories that mutually define each other and this can be explored in focus groups. In polls however, it is assumed that these are distinct and that the community as a unit of analysis is given.

In qualitative studies, statistical “representativeness” is not the goal of the research (Kitzinger and Barbour, 1999). Thus, techniques of sampling differ considerably from quantitative studies. In focus groups the aim is to give a voice to a few representatives of a group to express some of the lived experiences, ideas and concerns that are found within the group. The sampling is based on the research question and the project’s goals (Cronin, 2008). An attempt was made in the focus groups to include people of different ages and social status. We also considered important to have as equal numbers of men and women as possible.

THE FOCUS GROUP SESSIONS

Two focus groups were held in Vík on July 8th 2010. They took place in the Leikskálar Community Center in the heart of Vík. Refreshments were offered before and during the meeting. The participants sat in a circle, along with the moderator and an assistant who took down notes. The sessions were recorded and later transcribed.

Before the session, during the recruitment, we asked each person to bring with them one object that represented environmental change to them. They were told that this could be any type of object, such as a photograph, stone, tool, plant etc. They were also told that the environmental change symbolized by the object could either be of natural or societal origin or both. The purpose of this was threefold: 1) to give space for the material representation of the environment in the

focus group, 2) to encourage the participants to reflect on the topic of the focus group before the meeting and 3) to encourage storytelling as an alternative to the more structured discussions also included. Storytelling can be an important indicator of local ways of understanding and perceiving.

Following an introduction of the project the participants were invited to introduce themselves and the object they brought to the focus group. Then the topics of environmental changes, the community, natural disasters and climate change were discussed (see Appendix I).

After the meeting, participants were asked to answer questionnaires about their background such as age, occupation and education. Pictures were taken of the objects they had brought with them.

PARTICIPANTS IN THE FOCUS GROUPS

The participants of the focus groups were recruited with the help of the office of the Council of Vík that provided a list of possible candidates. The original list included 15 men and 16 women of different ages and occupations. We contacted them by phone, introduced the project and asked for their participation in the focus groups. Fifteen people agreed to participate and were able to come at the scheduled time, 10 women and 5 men. They were split into two groups, one with people over 24 years of age and another one with young people from 17-24. However, only 10 people showed up at the scheduled time, five in each group. Two (a woman and a man) had already cancelled earlier the same day. We called the cell phones of the remaining three, two women and a man. The women did not respond to our calls and the man told us he did not have the time. Thus, in all 3 men and 7 women participated.

The participants were split into two groups. Group I met at 2 p.m. and the discussions lasted approximately 1 hour and 20 minutes. This group was for people over 24 years of age, but one young woman, aged 23 took part in the group because she could not attend at the time the second group met. Group II was for young people 17-24 years old and met at 4.15 p.m. The session lasted one hour and 15 minutes.

Group I included four women and one man. The youngest was 23 years old and the others were 46, 52, 62 and 71 years old. All were born and raised in Vík or on neighbouring farms or had lived there since they were young. The four older people were married and two still had children under 18 that they cared for. Their level of education varied. Two had

finished university education; one had a matriculation examination (*stúdentspróf*). The remaining two had finished shorter, applied degrees. All of them considered it likely that they would be living in Vík 10 years from now. Two of the participants worked in public service; two for private companies and one was retired.

Group II included two men and three women, from 19-23 years old and all born and raised in Vík. Four of them were living in larger towns during the winter to pursue their education, but held summer jobs in Vík. All of the summer jobs were related to tourism, but the participant who lived permanently in Vík was an auto mechanic. When asked, all of them said they considered Vík as their “home”. One participant responded that she considered it “very likely” that she would be living in Vík in ten years time (in year 2020), three said “rather likely” and one considered it “rather unlikely”. Three of the participants said they were in relationships, but none had children. Three reported that they had finished high school (*stúdentspróf*), one had a diploma as an auto mechanic and one had not pursued further education after primary school.

THE INTERVIEWS

INTERVIEWS AS A METHOD

Unlike focus groups, interviews involve only one participant at a time and thus do not portray the interactive character of attitudes and opinion making. On the other hand, since they only involve one participant, they give more space for probing into answers. People are likely to express themselves differently in a group than one-on-one.

Six interviews were conducted in Vík, one in October 2009 and five in August 2010. The interviews were what Rubin and Rubin (referred to in: Bogdan and Biklen, 2003) call *guided conversations*. In guided conversations the interviewer has an open ended interview guide – or themes – but the structure of the interview is casual, resembling a conversation more than a formal interview. Such an open method allows the subject to discuss areas of interest related to the main interview topics. This method was chosen for its exploratory qualities, allowing the subjects to have very much influence on the discussion, thus giving space for their concerns and interests. Such an exploratory approach was considered particularly fitting to the relatively open research questions.

THE INTERVIEW STRUCTURE

Before the interviews the people were asked to do a short mental exercise as a preparation. They were asked to pick several places, in or around the village that represented the following four themes:

- A place that has changed considerably in the past 10-15 years.
- A place that you fear or that you feel is dangerous.
- A place you know a story about.
- A favorite place.

The first two themes relate to environmental change/climate change and risk. The third theme was chosen to encourage storytelling, which is a different mode of expression than dialogue. I hoped that encouraging storytelling in addition to asking questions could bring forth more detailed information about how the people relate to their environment. The last theme was chosen to give space for positive expressions about the environment, perhaps in contrast to themes one and two. One place could represent one or more of the themes.

The interviews were conducted on August 5th and 6th, 2010. They were split into two parts. First, I would drive around in a car with the participants and visit the places he or she had picked. I would give them a camera and ask them to photograph the places while they chatted. In some cases I took the photographs myself. The discussion in the car as well as outside was recorded.

After having visited all of the places, the interview would continue in the participant's home or workplace. I would download the photos from the camera to my laptop and then the participants would look at the photos and discuss them. The whole interview lasted around 2 hours. The interviews were transcribed.

The aim of conducting the interviews outdoors and focusing on places was to bring the specific characteristics of the places and the particular changes going on more into focus. Thus, the focus was shifted away from more abstract global environmental changes and the future changes related to them, to more concrete experienced local processes and the people's relations to them. With this approach, I aimed at giving space to what people had experienced themselves.

I also had several discussion themes that I probed into in the second part of the interview, if the information had not already been provided during the car ride (see Appendix II).

PARTICIPANTS IN THE IN-DEPTH INTERVIEWS

Our contact at the office of the Council of Vík provided us with a list of about 20 potential participants in interviews in Vík and we called them all. Most of them were interested in participating, but many planned to be on vacation on the dates proposed. Finally, five interviews were scheduled with two women and three men. All of them were born and raised in Vík or the neighbouring rural areas. The younger woman was in her mid twenties and ran a one-person service firm in Vík. The older woman was in her early fifties and was working as an office manager in a service company. The youngest man was in his late forties. He ran a small firm in the service sector. The two other men were in their early seventies and both retired.

RESULTS

The focus group discussions as well as the interviews were transcribed and coded. Four major themes were identified: 1) Coastal erosion and the road controversy, 2) the eruption in Eyjafjallajökull and the threat of Katla, 3) warming and environmental change and 4) the local economy, employment and regional development.

COASTAL EROSION AND THE ROAD CONTROVERSY

One of the participants in focus group B brought a small pebble to the group and described it thus (see picture 4):

I brought a pebble, a small pebble. It is just a pebble from the beach, a small beach pebble. And what I think is most interesting about this thing is that we build our houses on this here and we build our houses from this. This is what we found on the shore and we played with when we were children, although we weren't supposed to play on the beach (laughter). And yet, this is perhaps the greatest threat to our community now, it is the erosion of the land.



Picture 4: A pebble one participant brought to the focus group.

The quote describes well the relationship that the people of the community have to the sand that surrounds them. While they admire the beauty of the sandshore and have warm childhood memories of playing in the sandy landscapes, they also refer to the sand, and especially its interplay with the ocean, as destructive and dangerous. Furthermore, the beach has a major economic importance for the community. Vík is the second most visited tourist destination in southern Iceland (Icelandic Tourist Board, 2011) and a most of the visitors take time to enjoy the beach. In 1991 the Islands Magazine picked the beach in Vík as one of the 10 most beautiful in the world (Wikipedia, n.d.). The beach is thus central to the villagers in many ways: it represents the people's attachment to the place and the community's economic sustainability at the same time as it stands for natural hazard and danger.

Coastal erosion was the primary concern of the people interviewed as well as the focus group participants. In the interviews, people brought me to the shore and showed me points of reference, such as rocks, that were now out in the sea, but that they remembered being on land. These points of reference offered visual evidence of the severity of the erosion to outsiders like myself. For example, when we were standing on the beach, one participant I interviewed pointed out to sea and said:

Can you see that rock over there? The one that barely sticks out of the water? When I was a child and the sea had arrived at this rock, we thought it was great fun to stand on the rock and see if the wave would take us ... and can you see the brown line of rock on the mountainside? The sand used to get all the way up to there when I was a child. You could walk all the way out to the big rock there (*points to a rock*).

The long time since Katla's last eruption was stated as the main cause for the severe coastal erosion, as well as changes in dominant wind directions and ocean currents. One focus group participant also mentioned the rising sea level, due to global climate change as a cause. Participants also expected coastal erosion to accelerate in the near future. One participant in focus group I mentioned that an eruption from Katla might slow down, but not prevent, future erosion.

All five people interviewed picked the same place to represent both environmental hazard and a place that had changed rapidly in the past few years. For some it would also represent a favorite place and a place they knew a story about (see picture 5). This was the Monument for the German Sailor, which stands close to the beach, southwest of the village. The monument was erected in 2002 in honor of German sailors who wrecked their vessels in Icelandic waters and the Icelanders that came to their rescue.

One of the participants explains why he picked the monument as a symbol for environmental change:

This monument was placed here a few years ago. It was placed some meters further to the south, but they had to move it because the sea has taken so much of the shore here in the past years. My father said that they were placing it too near the sea when they erected it. People didn't believe him. Only a few years later they had to move it. Now it would be in the sea if they hadn't done so.

As the story indicates, the stone symbolizes the rapid coastal changes and the associated risks people link to these.



Picture 5: The Memorial for the German Sailor. Photo: ÁJ

In the beginning of the 1990's there was increased concern about the retreat of the coast south of Vík. In the mid 1990's it was suggested that a seawall be built in two stages parallel to the coast. In accordance with these suggestions, a 1.6 km flood defense wall was constructed in 1995. The second stage of the seawall was never built and in 2011, it was replaced with plans of a 300-meter long wall lying across the beach and out into the sea (Mýrdalshreppur, 2011).

Until recently, the construction plans of the seawall were entangled in a debate about a new road south of the village. The current main road to and through Vík is a part of the Icelandic “Route 1” that is most often referred to by Icelanders as “the Ring Road” because it runs around the island, connecting most of its habitable areas (the deep interior is uninhabitable). Since it is the main rural road in Iceland, it carries considerable traffic year round. West of Vík, the road lies over the mountain Reynisfjall, reaching an altitude of 119 meters above sea level (see picture 6). The village lies to the east of Reynisfjall (see picture 7) and the road runs through the center of the village.



Picture 6: Reynisfjall Mountain west of Vík and the Ring Road. Photo: ÁJ



Picture 7: Vík in Mýrdalur. Reynisfjall Mountain in the background. Photo: ÁJ

Many locals feel that the road is unsafe, mainly for two reasons. First, the road over Reynisfjall Mountain can be dangerous in winter due to ice and snow. Second, the traffic running through the village can be a threat to children and other pedestrians. For this reason, plans were made to

move the road further south towards the shore and drill a tunnel through Reynisfjall. A seawall would thus not only protect the land, but also the new road. This would require a much higher defense wall than originally planned. In addition, most villagers, whether for or against the new road plans, wanted the seawall to stand closer to the ocean than what was suggested by the Iceland Maritime Administration. Some participants said they feared that coastal defenses would be further postponed because of uncertainty around the road construction. This was solved in the autumn of 2010, when the design of the defense wall was changed from a seawall parallel the coastline to a seawall lying perpendicular to the sea across the beach and into the water.

The plans for a new road were heavily debated among the locals. Some felt that it would destroy the beauty and the unique nature of the coastline, which serves as the main tourist attraction of the area. Others felt that it was necessary because of road safety.

The road controversy became a major dividing issue in the local elections in the spring of 2010, as explained by a participant in focus group I:

This road course has split our community in two in a very bad way. It is very bad. People have been split into two groups and there has been a harsh conflict. We can't afford it. We are less than 500 people. We all need to stand together.

Another participant expressed the same feelings in an interview:

The last term has been very strange for this little community. It has been characterized by so much conflict and of a kind of fury that I had hoped didn't exist here anymore. It breaks one's heart. But this is the way it is.

And a woman who has lived her whole life in Vík expressed her despair in an interview in relation to the controversy:

I think we should just buy an apartment building in the suburbs of Reykjavík and move all of us there. I mean why build such an expensive seawall to stop this? Will it work? I have begun thinking about moving away from here. The community is so split on the issue of the road. There is no discussion about more important matters.

Some of the people said both in the interviews and the focus groups that the road should not have become a main issue in the local elections of spring 2010, because the road was already in the general plan of the municipality that had been sent to the Ministry for the Environment for confirmation, as the law abides. All three local parties running for elections supported the plans for a new road, but wanted to pursue different strategies in the planning process. In the autumn of 2010, the

Minister for the Environment decided not to confirm the plan for a new road and requested additional information, that the municipality is now working on providing.

The road controversy portrays how questions of adaptation can become political and even stressful for the community – possibly even resulting in increased vulnerability. This can be read out of the responses of some of the participants who said that the controversies had reduced the solidarity within the community and the quality of life of at least some of the people. This study does not evaluate or assess the political structure and culture of the municipality. However, the results indicate that an open and democratic political culture, accompanied by a reliable and advanced political structure can be important for community viability.

THE ERUPTION IN EYJAFJALLAJÖKULL AND THE THREAT OF KATLA

The results from the focus groups and interviews are in accordance with earlier studies on how people perceive the risk of an eruption in Katla (Jóhannesdóttir and Gísladóttir, 2010). Both studies find that some participants resist discussing the topic of a possible eruption. One of the participants, for instance, was eager to tell me about place names and his memories from these places. Whenever I attempted to discuss Katla, he did not say much and directed the conversation away from the volcano. On one occasion his answer implied that the risk was fabricated in Reykjavík:

Katla, I do not worry about Katla. I often get calls from Reykjavík and someone is asking if something is happening with Katla, some news about movement in Katla. We never experience any movement here.

When I asked him whether he had heard stories of former eruptions he simply answered “Oh, some perhaps” without going further into the topic. However, when I asked whether the tephra fall eruption in Eyjafjallajökull had changed the way he felt about Katla his answer indicates that he copes with the stress of anticipated hazards by pushing the thoughts away:

Question: Have you started to worry more about a Katla eruption after experiencing the tephra fall this spring?

Answer: Oh, no, no. I think people are just trying to forget about the tephra fall. But it was awful while it lasted.

A story told by another participant, also demonstrates such “purposeful forgetfulness”:

We do not fear Katla. Once I had to go to Kirkjubæjarklaustur [a village east of Vík, to get there one has to pass over the flood plains formed by melt water floods in Katla eruptions]. Someone told me that they had given out a warning because of Katla. But I just said: if my time has come, then it has come. So I just drove over [the flood plain of Mýrdalssandur]. On my way back I got a flat tire. I just fixed the tire on the middle of Mýrdalssandur without thinking once about Katla. It was only when I came home that I remembered it.

He continued to explain the difference between the risk associated with Katla and the risk linked to the coastal erosion:

We are prepared for Katla. You can't wallow in what you have no control over. We have attended a big exercise and we exercise regularly. However, we *can* do something about stopping the sea.

This indicates that some people may cope with the situation of powerlessness posed by Katla by downplaying the risk and avoiding to think of it.

Not all people I spoke to avoided the topic of Katla or minimized the risk of a possible eruption. Discussions in the focus groups showed how understandings of risk are not fixed, but negotiated in conversations and story telling. Thus, people may express feelings of control at one time, but show their doubts about society's ability to manage during natural disasters at another. The following excerpt from the discussion in focus group II portrays this. It starts with a frightening story and then moves to reassuring statements. In the end one participant expresses her doubts again when she says that at least she *hopes* there will not be an eruption:

Participant 1 (male): During the Laki eruption [*note: from 1783-1784*], the biggest natural disaster in living memory, there were men walking over Mýrdalssandur flood plain. They find themselves in tephra fall. And they describe that they almost cough up blood, there is so much in their lungs. They manage to get to Álftaver and two horses become blind. They are barely saved. They manage to find shelter. And they remain inside, with the horses and everything, in an abandoned house, where they linger and survive. They do nothing. If you don't manage to arrive at a shelter where you can breathe clean air, there is nothing you can do.

But the problem with Katla is the floods. They are much bigger than the floods in Eyjafjallajökull. That is why we don't think about the tephra. [...]

Participant 2 (male): There are two to three hours from the time the eruption starts until the flood comes down.

That should be enough time to get the cars away off the sand.

Participant 3 (female): Yes, but to get to all of the habitants of Vík...that is perhaps...

Participant 2: Yes, but it will be broadcast on all radio stations.

Participant 3: Yes, still I don't (*in a reassuring voice*) ...like people hiking,... like us [in the tourist service], we know where people are going. People come to us and they tell us where they are going, and we know where they are. We are able to reach them within 2 to 3 hours. And all the roads over Mýrdalssandur will be closed. I personally don't think we need to worry about this. Also, concerning Laugavegur (*the most popular hiking route in the area*), there people walk from hut to hut. The hut keepers know who leaves the hut. It's really well monitored everywhere. Two to three hours.... (*hesitates*) I think it is quite enough to (*stops*)

Moderator (Ásdís): But what did you say before? You don't think Katla will erupt?

Participant 3: No I don't think so. It has erupted every 50-60 years, now it has been 94 years....or 93.

Moderator: So you mean it is resting?

Participant 3: I think that the eruption in Eyjafjallajökull is just what needed to get out. I doubt that Katla will come¹. Or I *hope* not. One hopes not.

People's lived experience seems to be an important part of how they assess risk. Many of the participants stated that the recent eruption in Eyjafjallajökull had to a greater or a lesser degree altered the way they understand the risk of an eruption in Katla. One participant mentioned, for instance that the outburst flood that occurred in Markarfljót river following the Eyjafjallajökull eruption had made her think about the flood following an eruption in Katla:

The outburst flood is not what is most dangerous for us. It is the tsunami that can hit the village following the outburst flood. A seawall was erected to stop the tsunami. But when I saw the flood at the Markarfljót river, I thought: "will this seawall do any good? The flood after an eruption in Katla will be twenty times larger".

Others talked about how the tephra fall during the eruption in Eyjafjallajökull had also made them reevaluate their expectations in case of an eruption in Katla. There was considerable tephra fall over Vík

¹ In local parlance, people refer to Katla as a feminine figure and talk about her "arrival" in an eruption.

during the Eyjafjallajökull eruption in the spring of 2010, especially during the first week of May. The local elementary school was closed for two days and people were advised to wear masks and goggles when going outside. Everything was covered with tephra, even inside the houses, as the fine material managed to “slip into almost everything” as one person said (see pictures 8 and 9). Most of the participants described this as “extremely uncomfortable”.



Picture 8: Tephra fall in Vík during the Eyjafjallajökull eruption in the spring of 2010. Photo: Jónas Erlendsson.



Picture 9: Tephra fall in Vík during the Eyjafjallajökull eruption in the spring of 2010. Photo: Jónas Erlendsson.

Many stated that the recent eruption in Eyjafjallajökull made them rethink the threat of tephra fall from Katla. Some of the stories that they had heard about the 1918 eruption in Katla took on a new meaning to them. This discussion took place in focus group II:

Participant 1 (male): I hadn't experienced Katla as a threat until now when this started in Eyjafjallajökull. Then, I thought for the first time: yes, this is serious matter!! (*Laughs*). This [recent eruption] had such a big effect, yet it was a small eruption.

Participant 2 (female): I remembered that my grandfather told me [about the 1918 eruption in Katla]. You couldn't let your hands off the house wall when you were outside because then you got lost. You didn't see your own hands. The old stories of Katla make one think: shit, and this [recent eruption] is just a small one!

Participant 1: I also think this [second eruption in Eyjafjallajökull] is good because then everyone is prepared if Katla starts erupting. Now people have to start thinking about how to prepare for tephra fall. We hadn't thought about that before. You know, they always talked about glacial outburst flood and earthquakes, but what are we supposed to do in the case of ash fall?

In a similar way, one of the people interviewed, a man in his forties, said that having the lived experience of the eruption in Eyjafjallajökull changed the way he thought about the risk of an eruption in Katla:

My grandfather fled on a horse from the last eruption in Katla in 1918. So I heard stories of the eruption when I was a kid. And really, people couldn't see their hands when their arms were outstretched during the middle of the day - there was so much darkness. And there was so much electricity in the air that when they moved their fingers, it sparkled between them. To tell you the truth, I thought these stories were exaggerations until I experienced the eruption in Eyjafjallajökull this winter. Then you see it and feel it on your own skin. And I just say: God help us if we are going to experience an eruption in Katla. It may be worse than Eyjafjallajökull.

And a young woman commented in an interview:

You know, I had heard many stories of people who did not even see their hands [in the tephra of the Katla eruption in 1918]. I just never thought about it, somehow I found it unbelievable. Then it happens to yourself, you know, not to see anything at all, then obviously you begin to believe the stories.

Some mentioned that they feared that the tephra fall could possibly hamper the evacuation and rescue operations. What were people to do if they suddenly found themselves in the complete darkness of the ash? As

one young woman put it in focus group two: “if you are somewhere in the countryside, you’re quite simply lost if there is severe ash fall”. One participant said, in an interview, that he felt that the Icelandic Civil Protection Department (ICP) (*Almannavarnir*) did not sufficiently take the tephra fall into account in their rescue plans:

[The rescue plans] have been focused on protection against floods. The people who live here on the sand [near a possible runway of the flood] are supposed to flee to higher areas because of a possible flood. This is all good, but this hazard only lasts perhaps a few hours. But the ash fall can last for months. A friend of mine has suggested it to the ICP that they make a plan to evacuate the people from the area. Those who are sick, those who have heart disease or asthma, they need to get away very fast.

One participant said that the Eyjafjallajökull eruption made him skeptical about the sciences and scientists’ ability to foretell eruptions and issue a warning in time. Everyone he noted, including the residents in the area and the scientists, were taken by surprise by the eruption. When another participant mentioned that a week before the eruption it was possible to follow the movement of the magma with the help of monitors, he added: “yet nobody expected it would start. It just started!”

The participants also talked about the negative economic effects of the 2010 eruption. The reliance on tourism increased the vulnerability of the region following the event. The tourist season started very badly and almost no people traveled to the region. Some participants were angry at the car rentals, because they would not insure cars in the area around Eyjafjallajökull. However, many noted that the tourism had quickly recovered and bookings in July were as expected in a normal year.

In sum, the results show that perceptions of environmental risk are not fixed or stable and therefore it is important to explore how they are negotiated and constructed within the community and in relation to lived experience of the environment. Local oral knowledge, as well as scientific knowledge about risk is partly understood in relation to people’s lived experience. As Jóhannesdóttir and Gísladóttir (2010) I found that in some cases “there seemed to be a lack of interest, apathy and silence about Katla” (ibid: 413), especially among the older participants I interviewed. However, many of the participants felt that the recent eruption in Eyjafjallajökull had made them reevaluate the risks associated with an eruption in Katla. They felt that the Icelandic Civil Protection Department, as well as themselves, had downplayed certain risks, the tephra in particular. One participant mentioned that people were now better prepared for a large eruption in Katla. Whether this is true or not, however, depends on the extent to which this recent

eruption leads to efforts of improved mitigation or preparedness plans on the household level, that have been lacking until now (Jóhannesdóttir and Gísladóttir, 2010).

It is interesting to compare the two sources of risk – the erosion and the eruption – in the context of community viability. The risk of an eruption in Katla is institutionalized in the sense that the volcano is monitored and action plans are in place. Evacuation plans that are practiced regularly can be seen as collective enactments of the risk, through which people gain a certain sense of control. Thus, the risk of an eruption has to a certain extent become an established part of life in the village. Interestingly, the participants in general seemed more at ease and less concerned with this risk than the erosion. The erosion was seen as more out of control and unpredictable. Some of the participants felt that appropriate action had not been taken to protect their properties and blamed either the local new-road-politics or the procrastination of the national institutions responsible for coastal defenses. Thus, the erosion was seen as more entangled in politics than the eruption. The results indicate that the way in which risk is managed may influence whether people experience risk as a source of stress and threat to their daily life. This in turn may have implications for community viability and adaptation to risk.

WARMING AND ENVIRONMENTAL CHANGE

Most of the participants reported that they had experienced a dramatic change of the climate in the past 15 years or so. It had become warmer than previously and this was for example seen in the vegetation, especially the proliferation of certain plant species, reduction of sea birds and the retreat of glaciers. However, in general (and with some exceptions), the participants did not connect this to global climate change in particular.

Wild chervil (*Anthriscus sylvestris*) was imported to Iceland as a decorative plant for gardens in the early 20th century. Around 1990 it started to proliferate in North Iceland and is now rapidly spreading in other areas as well. Lupine (*Lupinus nootkatensis*) is a North American species that was imported to Iceland in the mid-20th century for soil conservation purposes, because of its efficiency in increasing the fertility of the soil. Since 1980 it has become common in all parts of the country (Icelandic Institute of Natural History et al., 2010).

Because of coastal erosion and frequent sandstorms from the outwash plains formed by floods during Katla eruptions both west and east of the village, soil conservation has for a long time been a major issue for residents in the area. Sandstorms used to cause them problems on a regular basis, closing roads and damaging cars. In the past years, soil conservation has led to dramatic changes in the Mýrdalssandur outwash plain, where lupine has been planted to restrain the sand (see picture 10). One participant brought me to Mýrdalssandur and commented as we looked over the plain:

The sandur looks so much different from what it used to. Because of all this vegetation. The lupine has grown extremely fast in the past 5 years or so. It has been getting warmer. Just look at the weather today. It is like in Mallorca.

Question: why has it been getting warmer, do you think?

I don't know. Don't they say that these things go up and down? Natural fluctuations?

The vegetation of Mýrdalssandur is likely to be flushed away in the next Katla eruption, as the most common path of the flood is over this sand plain.



Picture 10: Lupine on Mýrdalssandur outwash plain. Photo: ÁJ.

One participant in focus group II said that more lupine should be planted to restrain the erosion. Today, sandstorms are not as problematic as some years ago when they led to temporary closures of the main road. “When we were kids,” another focus group participant recalled, “there were always trucks that were stuck here because of sandstorms. The [road over the flood plains] was very often closed, every time it was

really windy.” This happened, she said, a lot less after lupine had been sown to stop the sand drift. Another participant remembered that 10-15 years ago he could sometimes not go to school because of sandstorms in the lower part of the village. One participant recalled a story:

One old man who lived here ... after the eastern winds had dominated for a long time ... and the drift came from Mýrdalssandur and the shore...he emptied 20...12 to 20 full trucks [of sand] from his lawn. It was a major operation, just to see his grass again!

Others expressed their concern about the proliferation of chervil and lupine and said they regularly had to spend much effort to stop these species from spreading in their private gardens and destroying other plants. Although there was a consensus in the focus groups that this was due to a warming climate, many participants expressed their doubts about global climate change and its part in the recent warming in Iceland. One of the young men in focus group II doubted, for instance, that the empirical evidence for global warming was extensive enough:

We have so little data and so few measurements. Look, we have only one measurement from *one* volcanic eruption, and that is just from six months ago [referring to the Eyjafjallajökull eruption]! We can never look up measurements from the 18th century and say: well this year the temperature was such and such. This is only happening now. In 200 years, perhaps, I can tell you whether global climate change is happening.

Another participant discussed her concern about the rapid spread of angelica (*hvönn*). In an interview, she pointed at the hills of Reynisfjall mountain and said they were now covered with angelica: “This looks green now, but in winter it is just black and really ugly.” She said she believed this to be linked to global climate change.

Several participants mentioned that they had noticed a dramatic reduction in the population of some sea birds, especially puffin (*Fratercula arctica*) and the arctic tern (*Sterna paradisaea*). One participant said he used to hunt puffin, but last time he went hunting, four years ago, he found most of the chicks dead outside their holes. Since then he felt it was inappropriate to hunt the birds. When asked, he said that the most likely explanation for the disappearance of the puffin was lack of food, but that he was not sure of the reason for this.

One participant also mentioned birdlife in an interview. She said that she had seen extreme changes in birdlife: “You never see tern chicks sitting on the road like you used to. And the puffin is having a hard time too.”

When I asked her what the reason for this was, she said that sandeel, the main feed of tern chicks, had disappeared in the past years:

I do not know why. Some people say it is global climate change. But perhaps it is just the mackerel that eats it. So it is a good thing Icelanders have begun to fish the mackerel.

Sólheimajökull (picture 11), an outlet glacier from Mýrdalsjökull, has been retreating fast in the past years. Some people referred to this in the focus groups and the interviews. In focus group I, for instance, the physical changes in Sólheimajökull were discussed and people agreed that the retreat was due to a warming climate, albeit not necessarily global climate change:

Moderator (Ásdís): Do you think the recent environmental changes you have been referring to are related to global climate change or ...?

Participant 1 (male): There have always been fluctuations in temperature. Fifty to sixty year fluctuations.

Participant 2 (female): And then it begins to cool down again.

Participant 1: Yes, something like this. A warm period for 50-60 years and then it cools down again. That's the way it is. It could be just natural fluctuations.

Participant 2: Look at the glaciers, they are retreating. Really fast. For instance Sólheimajökull. Have you noticed? Especially in the past 10 years.

Participant 3 (female): 15 years.

Participant 1: I was working there at Sólheimajökull, it was probably in 1985 or 6. I was repairing the roads with my father. We had to make a new parking lot because the glacier had taken the old one. Then the glacier was advancing. It went over the parking lot one winter so we had to make a new one in the spring.

Participant 2: yes, it was warm when I was a child, then it got colder again and then it has gotten warmer again [the woman is in her early seventies].

Thus, although the participants knew about global warming and agreed that the local climate is currently warming at a rapid rate, many of them chose to rely on alternative explanations. In general, the participants seemed to prefer explanations referring to cyclical trends to the linear one of global climate change. Cycles seemed to fit better with their own experiences of the environment and to local oral knowledge about an unstable climate.



Picture 11: Members of CoastAdapt visit Sólheimajökull in August 2010. Photo. ÁJ.

The rapid glacier retreat has caused increased fluctuation in the glacial rivers. Due to the retreat, the rivers carry more mud than before, which causes them to flow over the defenses that have been built to constrain the river. One river, Klifandi, for instance threatens a recreational area with holiday homes. Moreover, the river now approaches an archeological site that is possibly a farm from the times of Iceland's earliest settlement around year 1000. According to the former director of the local council of Mýrdalshreppur, of which Vík is a part, it has proven difficult to address the problem because of organizational uncertainty. The Road Administration's role is to protect roads and bridges from rivers, but it was uncertain which public body was in charge of protecting vegetation and land. "And it is probably global climate change that is behind this" he concluded in an interview. This example portrays how rapid environmental change can lead to organizational uncertainty in dealing with new issues as they come up. Organizational flexibility and good local networks to national governmental organizations can be vital for adaptation in such cases.

In sum, all of the participants agreed that the climate has been getting warmer in the past few years and related specific changes in vegetation, bird life and glacier retreat to these changes. However, there was more variation regarding whether people considered the changes to be signs of *global* warming, or whether they saw this as local and cyclical climate processes. Older people pointed out that they had experienced warm periods such as the past 15 years before. To them this was not exceptional in any way.

LOCAL ECONOMY, EMPLOYMENT AND REGIONAL DEVELOPMENT

The structure of the local economy and employment is an important factor contributing to resilience or vulnerability when a society is faced with environmental challenges. During the 20th century, the Icelandic economy developed from being largely based on agriculture, with most people working on farms, to being more diversified and reliant on modern technology. During this time, there were massive changes in the structure of habitation with people moving from the farming communities to larger towns, mainly to the capital. The changes toward urbanization were more dramatic in Iceland than in the other Nordic countries. This process is still ongoing and most rural areas in Iceland continue to be vulnerable to losing people, especially the young and educated (Ólafsson, 1997). Concerns about the local economy and community development were discussed in both focus groups. An older woman in focus group I reflected on the changes she had observed during her lifetime:

The work has changed with increased technology. There is less employment. And there is less diversity in the employment.

Other participants in the same focus group explained that the structure of services in Vík had changed. There used to be two large stores in the village that served the agricultural community, as well as two slaughterhouses. Moreover, two car repair shops were in the village. All of these shut down during the last part of the 20th century, mostly during the 1980's. Furthermore, a LORAN station for radio navigation, a workplace for ten people that had been established in Vík during WWII, was shut down in 1977.

In the past years the service sector has changed focus from the agricultural community in southern Iceland to the growing tourist industry. According to the participants in the focus groups this results in greater seasonal fluctuations in the service industry. Young people who have moved from the village to study come back during the summer to work in tourism, but leave as soon as the season is over. This was the case with some of the participants in the younger focus group, as well as the children of the older people interviewed. A young woman commented on this:

This is not positive for young people who want to move back home and find a good job. There is no employment here, unless you create it yourself.

Asked whether they expected to still be living in the area in 20 years, the participants of the focus group with young people had the following conversation, reflecting that they felt a deep attachment to the community, but were not optimistic about employment opportunities in the future.

From a discussion among the young people of focus group II:

Participant 1 (female): If people are going to live here in the future they will need to find some ways to support themselves. We have no harbor to support us. We do not have an aluminum factory or something like that, you know. We have nothing, so you just have to create your own job to get a salary.

Participant 2 (female): I would like to live here in the future if there is employment.

Participant 3 (female): I am studying for a university degree. I would also like to live here, but considering the current situation, there are no opportunities, you know.

Participant 1: there are no jobs!

Participant 4 (male): I think most young people would like to live here.

Participant 5 (male): I think so too! It is just a question of employment.

Participant 2: If I lived on the other side of the planet, like in Africa, this would still be my home.

A young man continues by pointing out that it is not only about the employment, but also about the “culture” within the village, which some of the participants felt had been deteriorating during the road controversy discussed above:

Everything has to be taken into consideration. Like you know there have been so many debates. About the Municipal Plan and the road and other things. Sometimes it just becomes too...(*sighs*)...it bothers too many people. It influences whether people cooperate, you know.

The older people in focus group I said that the employment situation had improved in the past two years (2008-2010), because of the economic crisis in Iceland. They explained this:

Participant 1 (male): People have moved back here after the economic crisis. Everyone has got a job. There are no people unemployed. They came back because they lost

their job in the capital. The economic boom was mainly in the capital. We lost people during the boom in the capital because we could not compete with the salaries being offered there. Local companies could not raise the prices of their products.

Participant 2 (female): I think the young people have been coming back home because they have a safety network for the family here that they didn't have where they were. And then in times of crisis people always go back to their family.

In sum, the participants felt that, in general, the economic development of the community had been unfavorable in the past years. Services have always been the major source of income in Vík. With the declining importance of agriculture and improved transportation the service sector in Vík has gone through structural changes. Services are becoming less diverse and seasonal fluctuations have increased with the growing importance of tourism. Many participants, especially the young people, felt that these changes were making the community more economically vulnerable and they were not very optimistic about future employment possibilities.

DISCUSSION AND CONCLUSION: LIVING WITH ENVIRONMENTAL CHANGES

This report has examined how the people of Vík experience the rapid environmental changes of the past years in the context of the viability of their community and moreover, whether and how they relate these changes to global climate change. CoastAdapt is focused on developing ways to enhance the adaptive capacity of coastal communities in times of climate change impacts. The IPCC defines climate adaptive capacity as “the ability of a system to adjust to climate change (including climate variability and extremes), to moderate potential damages, to take advantage of opportunities, or to cope with the consequences” (IPCC, 2007).

Instead of focusing on climate change specifically, this report examines the main concerns about environmental and social changes from the point of view of the inhabitants. Thus, the report has mainly been concerned with *the context* that climate impacts may be perceived and understood in. In Vík climate impacts, where they exist, are only

marginal increases of existing hazards. The main concern of the people of Vík is related to volcanic activity and coastal erosion that are mostly due to non-climate related factors.

Faced with these immediate hazards, it is clear that the increase in risk attributed to climate change is uncertain and minor. Other impacts of the warming of the past years, such as better weather and revegetation of the sandy flood plains in the vicinity of the village are to a large extent experienced as positive (the proliferation of invasive plant species and a decline in bird life are an important exception). For these reasons, global climate change is a relatively insignificant concern for most of the people I spoke to. All of the participants were aware of the rapid warming in the past years and they also knew about global climate change from the media, yet many, if not most of them, preferred local explanatory models in understanding these changes. They, or their parents or grandparents, experienced a similar warming period in the 1930's and 40's in Iceland. At that time, glaciers retreated as they have done in the past years. Towards the middle of the century, the climate cooled again and the glaciers started advancing. Many people I spoke to referred to this when they expressed their belief that the current warming was a part of natural variation. It is important to note that this understanding does not contradict science. In current years, the climate has warmed faster in Iceland than expected by the IPCC models. Scientists have concluded that the current warming trend is partly a local natural trend, superimposed on long-term global warming (Björnsson, et al., 2011).

This demonstrates the challenges related to the fact that global climate change is abstract in the sense that it is a long-term change that cannot be experienced directly. Unlike weather that is felt on the skin, climate change can only be "seen" in numbers and graphs. In other words, there is a temporal and spatial mismatch between climate change impacts and the experiences of people. While global climate change is not measured on the scale of events, it is primarily specific events or processes that are likely to engage people in environmental issues. Drawing out climate change as a causal source of local events or processes, such as the recent warming in Iceland (which is still short-term related to the frame of reference of the IPCC), will thus be based on how the issue is *framed* by the actors involved. This is one of the reasons why public concern with climate change is likely to fluctuate and not always reflect the level of concern in expert communities.

In the construction of policy tools and measures to enhance climate adaptation at the local level, it is important to acknowledge that climate impacts interact with other social and natural processes. Ignoring this can lead to policy distortions where the marginal impacts of climate change on local hazards is highlighted while their main causes are

downplayed (Pielke et al., 2007). This has, moreover, implications for programs that aim to involve the public in climate adaptation. While it may sometimes be appropriate, the framing of public foresight exercises in terms of climate change, risks drawing attention away from the experiences and knowledge of the locals towards expert knowledge and climate modeling. After all, the external experts know most about global climate change, while the locals' expertise lies in the complex social and environmental processes happening in and around their community.

To some extent, then, adapting to climate change may involve "business-as-usual". People will continue to react to ongoing socio-environmental changes and natural hazards as they have done in the past. However, this does not mean that climate adaptation policy is not relevant. Climate impacts may increase the pressure on existing issues, such as resource use, water management and conservation. In some cases, these issues may be highly contested and political. There is thus an increased need and incentive to learn from the policies of the past and from the experiences of others. The goal of CoastAdapt is to develop a forum of mutual learning, where communities can share their experiences, tools and best practices.

There are also cases where climate change will create new and critical issues for communities to deal with. In Iceland, for instance, ocean acidification may develop into a real threat, potentially resulting in negative impacts on the Icelandic fishing industry. In such cases the need for climate adaptation strategies are evident.

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APPENDIX

Appendix I: Discussion guide for focus groups.

Environmental changes

- Have you noticed any changes in your environment in the past years and decades? What changes?
- How have these changes affected you and the society?
- Are these changes a threat? How so? Are they an opportunity? How so?

The society

- How has the community changed in the past 20 years (10 years for the younger group) (including the industrial structure and employment opportunities)? Threats? Opportunities?
- How do you envisage the changes in the community to the year 2030? Will there be the same employment opportunities? Will environmental changes affect the community in any way?
- During the recent local elections, what was the main issue in Vík? What are the local politics about? Are environmental matters an issue in any way?

Natural disasters

- What is main source of natural hazards here? How do you think about these hazards? Do you feel safe? How are you prepared for disasters?
- Are houses and roads safe in case of natural disasters?
- What about the eruption in Eyjafjallajökull? How has that affected this area/community? How did the eruption affect you?
- What about coastal erosion? What is being done to prevent it (is it enough)?

Global climate change?

- Have you noticed any changes in the weather in the past 10-15 years? If so, why do you think this is?
- Is global climate change having an effect here? How will it affect the environment in the coming years? Will it have an effect on the community?
- It is predicted that the sea-level will rise. Do you think that it will have any effects here?
- Do we need to respond in any way to global warming?

Appendix II: Questionnaire guide for the interviews.

Personal information

- How long have you lived in Vík?
- What is your profession?
- Family?

Environmental and social changes

- What changes have you experienced in your local environment (Vík and surroundings) in the past years/decades?
- How do you anticipate these things to develop in the next 10-20 years?
- How has the society here changed during your lifetime?

Coastal erosion

- How has the coastal erosion here developed in the past years/decades?
- What have the reactions to it been? Have any measures been taken?
- In your opinion, have these measures been sufficient? What is lacking/what is good?

Eyjafjallajökull eruption

- Did you experience the eruption in Eyfjallajökull?
- What effect did it have on you/your family/your daily life?

Climate change

- Do you think that global climate change has had/will have effects in your local environment (in Mýrdalur)?