Master's thesis

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Community Resilience as a Strategy for Disaster Readiness in Rural Communities

A Comparison between Nepal and Norway

Master's thesis in Globalisation and Sustainable Development
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Acknowledgements

This master's thesis is the result of two years of studies at the Department of Geography at the Norwegian University of Science and Technology (NTNU). During these years, I have taken part in many educational and inspiring courses as well as participating in a 5-month internship at the International Centre for Integrated Mountain Development (ICIMOD) in Kathmandu, Nepal. My time in Trondheim and Kathmandu has provided me with relevant and exciting experiences in both the academic and professional sectors, and for that I am proud of my decision to choose NTNU as the institute to undertake my master's degree.

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Abstract

There are many differences which become immediately evident when comparing rural communities in Nepal to those in Norway. On the surface it is easy to distinguish differences in culture, language, and levels of development between rural communities in the countries with less obvious differences in traditional practices and cooperation between community members becoming more obvious after closer examination. These differences have been driven by specific historical events and environmental factors unique to the region that these communities are situated in. However, despite their differences what is becoming ever more apparent are the similar challenges that these communities face as a consequence of global climate change. It is estimated that climate change will result in increased levels of annual precipitation as well as more frequent and longer periods of drought for communities in both Nepal and Norway. As a result, small rural and agrarian communities, whose livelihoods depend on the environment around them, will become more exposed to the effects of climate change. This paper examines how well equipped two communities in Nepal (Fulbari & Patalekhet) and Norway (Rissa and Byneset) are to deal with potential future environmentally hazardous events and how they can enhance their community resilience towards such events. Field observations and interviews with local community members in these areas were deemed to be very important assessment tools and were therefore carried out to gain a better understanding of how these communities operate and their overall level of preparedness towards these potential future environmentally hazardous events. This study focused specifically on three particular dimensions of resilience, them being social capital, community capacity and information & communication. The findings of this thesis indicate that out of the four studied communities Fulbari has the most limitations when it comes to preparing for climate change. The results indicate that an emphasise should be made to improve the sense of community with in the Fulbari community to further strengthen their resilience levels. Whilst in the two Norwegian communities the results from this study indicate that more effort should be made by local actors to share specific information about climate change relevant to these communities, and that community members should work together more to share information between themselves.

Dedication

I, David Ellis Johnson, do hereby declare that this thesis entitled "*Community Resilience as a Strategy for Disaster Readiness in Rural Communities: A Comparison between Nepal and Norway"* is my own research work. This research was conducted in the spring semester of the academic year 2019 under the supervision of Professor Haakon Lein from the department of Geography, Norwegian University of Science and Technology (NTNU), in Trondheim, Norway.

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Acronyms and Abbreviations

BCPR	Bureau for Crisis Prevention and Recovery
CC	Climate Change
CEAPRED	Centre for Environmental and Agricultural Policy Research, Extension and Development
CSRC	Community Self Reliance Centre
DSB	Directorate for Civil Protection and Emergency
GNI	Gross National Income
HDI	Human Development Index
HEFA	Health and Education for All
HICAP	Himalayan Climate Change Adaptation Programme
HKH	Hindu Kush Himalaya
HMS	Health, (work) Environment and Security
ICIMOD	International Centre for Integrated Mountain Development
INGO	International Non-Governmental Organisation
IPCC	Intergovernmental Panel on Climate Change
JICA	Japan International Cooperation Agency
NGO	Non-Governmental Organisation
NPC	National Planning Commission
OECD	The Organisation for Economic Co-operation and Development
RMS	Resilient Mountain Solutions
RMV	Resilient Mountain Village

ROS	Risk and Vulnerability Analysis
SDGs	Sustainable Development Goals
SESs	Socio-Ecological Systems
STN	Blacksided Trønder and Nordland Cattle (an endangered breed of old native Norwegian dairy cows)
UN	United Nations
UNDP	United Nations Development Programme
ÖWK	Ökumenischer Eine-Welt-Kreis

Glossary

Aalika	A women's group (Aalika in Nepali means "female friend") Aalika members meet on the 9th of every month, according to the Nepali calendar, to discuss issues related to their community. There are 31 members of the Aalika women's group from this community which meet and contribute 50 rupees each month to the group. This money can then be distributed to those in the community who are most in need at a zero percent interest rate as long as money is reimbursed to the group within 3 months. This group was established to discuss money and harvesting between the women in the community, share knowledge and experiences, as well as discuss current issues. However, Nirmala told us that this group does not discuss future hazardous events such as earthquakes, wildfires, or future drought. Whilst Nirmala said that future hazards are not considered a risk, she said that the women's group and the community do gather to discuss water management techniques.
Adhaya	"A sharecropping regime in which landowner or state takes half the produce as rent or tax" (Dhakal, 2011).
Aphid	A small bug which reproduces rapidly, sometimes without even the needing to mate, and feeds by sucking sap from plants. Thus, large numbers can develop quickly and cause extensive damage on crops grown by communities in the Kavrepalanchok.
Blight	Refers to a sign that a plant is being affected by an infection, normally a fungi infection.

Bondelag	The Norwegian Farmers' Union is the largest trade union for farmers in Norway with over 63,000 members.
Dashain	For many religious and ethnic groups of Nepal, such as Buddhists, Hindus, and Kirats, Dashain is the most important festival in the calendar year. The celebration lasts for 15 days in either September or October each year and celebrates the victory of good over evil.
Hanuman	Local community group named after the Monkey God who is a symbol of strength and energy in Hinduism. The Hanuman group was formed as part of a CEAPRED initiative to great more community lead resilience building projects and has 24 members and is one of six such groups operating in the area.
HASERA	An organic farm and permaculture learning centre in Nepal.
Innovasjon Norge	A state-owned Norwegian special-purpose company established with the purpose of increasing innovation in business and industry across Norway and contributing to developing the districts.
Jholmal	“A homemade bio-fertilizer and bio-pesticide which is prepared by mixing and fermenting locally available material in a defined ratio that includes animal urine, water, beneficial microbes, farmyard manure, and leaves with a pungent odour and taste. It is helpful in controlling insect pests that attack and damage crops, protects crops against fungal and vector-borne diseases, and improves plant health” (Mishra & Agrawal, 2017).
Kut	“A rent in cash or kind paid by sharecropper/tenant to landlord or directly to State in past Raikar arrangements” (Dhakal, 2011).

Namuna Krishak Samuha	An agricultural group which translates to “Model Farmer Group”.
OIKOS	A member organisation which works to promote organic food and agriculture in Norway with ambitions to create an “organic Norway”.
Parma system	“Related to the reciprocal labour exchange system in Nepalese agriculture” (Bhattari, 2006).
Puja	Is an act of worship to God in Hinduism.
Social mobiliser	A person responsible for mobilising the community through dialogue, sharing of knowledge of local problems, and awareness raising with both the local actors and the community.
Tine	A Norwegian cooperative company which is owned by around 11,000 milk producers. The core business is the production and sale of milk, cheese and other dairy products in Norway and abroad.

Land Area Measurements Nepal:

Anna	Nepalese customary unit of measurement which equates to 31.79 metres squared.
Ropani	Nepalese customary unit of measurement which equates to 508.74 metres squared.

Land Area Measurements Norway:

Mål An old Norwegian unit of measurement which equates to 1000 metres squared.

Caste and Ethic Groups in Nepal

The famous French anthropologist Louis Dumont wrote an influential book on the caste system of India which was published in English in 1970, in this book Dumont illustrates how the caste system was established, works, and the implications it has on millions today both in India and in Nepal, which shares many cultural similarities with its neighbour India. In this book he writes about the contradiction of the clean and unclean and how this idea is ingrained into the caste system of India and Nepal. He talks about the complexity of the caste system but how it essentially groups people to different levels of society, within such levels individuals are assigned certain roles (for example the reservation of specific occupations to the relevant caste group). These ideas, whilst not as strictly enforced in Nepalese society today, still have implications on individuals within the communities studied. Below is a brief description, using Dumont's classification, of the two caste groups, Brahmin and Dalit, which those interviewed belonged to, as well as the ethnic group Tamang.

Brahmin	Brahmins are at the top of the caste system in Nepal. Originally the Brahmins have been the priests, or religious leaders, as well as teachers. These roles mean that the Brahmins are considered the purest cast and therefore are also often chefs as people would not eat food prepared by individuals of a lower caste than their own.
Dalit	Dalit is the lowest caste in the caste system of Nepal. Dalits are considered impure and therefore find themselves at the lowest level of society. They have traditionally been assigned jobs and roles which are considered dirty, such as cleaning and waste disposal. In certain parts of Nepal, Dalit farmers believed that they could not grow particular vegetables such as cauliflower as these vegetables were seen as high class.

Tamang	Unlike Brahmin and Dalit, Tamang is not a part of the Nepalese Hindu caste system. Tamang refers to the largest Tibeto-Burman ethnic group present in Nepal. Tamang's are orthodoxly Buddhist by religion. Tamang's are largely agricultural labourers in Nepal, however, due to historical discrimination of Tamang people in Nepal most Tamang's remain poorly educated and with less valuable and arid land. Therefore, many rely heavily on rainfall and do not engagement in modern agricultural techniques and thus primarily grow corn, wheat and potatoes.

1 Introduction

1.1 Background

In recent decades there have been frequent discussions at a global level regarding climate change (CC) and the potential consequences it may have on our planet's fragile environments. The discussions have normally focused on whether climate change is caused by anthropogenic or natural processes, what are the main anthropogenic processes which are contributing to accelerated rates of climate change, and how we can mitigate future impacts of climate change. These discussions have therefore, more than often, focused specifically on a global warming world and have, until recently, not taken into account the regional and/or local variations that CC is having in different areas of the world. For example, when discussions are framed in a global warming world context the focus is largely on global temperature rises, the melting of ice and glaciers in the Earth's Northern and Southern polar regions, and how this effects the planet's oceans and low-lying areas. Thus, other areas of the world such as mountainous regions which also experience temperature rises and glacial melting but are unlikely to be affected by sea level rises are mostly forgotten about or disregarded as non-urgent matters. Omitting local variations from discussions can be very concerning for the vulnerability of the communities in these omitted areas. Whilst, it is likely that in our lifetime we may not witness the full extent of the impacts of CC on our environments and ecosystems, changes that we have witnessed already are cause for great concern. Severe impacts of climate change are already being felt across different ecosystems and sectors of the world including the often-forgotten mountainous regions.

1.2 About the study

Recent reports, such as those published by the Intergovernmental Panel on Climate Change (IPCC), have begun to realise the importance of localised variations in global climate change and assess the impacts that these variations may have on specific regional, sub-regional, and local developments (Yohe, et al., 2007). Given the importance of understanding how local and regional variations in climate change can affect the development of specific areas over others, this thesis shall focus on the impact that hazards related to climate change have had and are likely to have on

selected rural communities in Nepal and Norway. By concentrating on the local variations of climate change and how they impact the selected communities, Patalekhet (Nepal), Fulbari (Nepal), Rissa (Norway), and Byneset (Norway), this thesis aims to identify any strengths and/or limitations which could be improved to enhance community resilience towards localised climatic changes in these case communities. Taking into account the complexity and often vague meanings of the term "community resilience", it was decided that this study shall focus on the social aspect of the plethora of definitions for community resilience. More specifically this thesis will set out to examine how three social dimensions of resilience (social capital, information and communication, and community capacity) influence the preparedness of the selected communities towards hazards related to climate change. Special attention was given to the social dimensions of community resilience in this thesis as they have often proven to be easier, quicker, and less economically costly to change and improve thus meaning that the selected communities in Nepal and Norway will be in a better position to enhance their own community resilience towards climate change through the implementation of these transformations. In order to better understand how these dimensions influence community resilience this study conducted interviews with local community members using a qualitative methods approach. Through purposive sampling members from each community were identified and approached to take part in a semi-structured face-to-face, telephone, and/or email interview. The findings from these interviews represented the main results of this study and were compared and discussed to identify shared strengths and limitations between the communities towards hazards related to climate change.

1.3 Comparing communities in Nepal and Norway

Communities in both Nepal and Norway are used to challenging weather conditions and have adapted over the years to become resilient to weather changes. However, over recent years both Nepal and Norway have been presented with many new challenges for their farming communities. These climate related challenges are often complex and combine both extreme weather events, such as heat waves, droughts, and flooding, which have been observed across both Nepalese and Norwegian communities in recent years, with slower onset climate change impacts, such as afforestation, less lying snow, and/or the spread of vegetation destroying pests. These recent changes to the climate in both countries are not however only individual freak

events but rather may be a glimpse at the possible new normal conditions which these communities will have to adapt to cope with as a part of their life in these areas. However, instead of negatively focusing on emphasising the potential vulnerability of these communities to the challenges that they are likely to face in the future, a more positive attitude could be to concentrate on building the communities' resilience towards such environmental hazards. Communities may be a vital factor when it comes to thwarting disasters and speeding up the recovery process. Such climate related disasters can have very serious physical and social consequences on communities and therefore it is essential that communities of all development statuses and sizes are able to prepare themselves before, cope during, and bounce forward after a disastrous event.

Given that the Nepal is currently ranked amongst some of the lowest countries in the world in terms of development and amongst the highest in terms of level of risk, the predicted accelerated temperature rises and intensified flooding and drought events pose a serious threat to many already vulnerable communities across the country (this will be discussed in chapter 4 in more detail). Therefore, building resilience in these communities is an urgent issue. However, in most countries making political and economic changes to focus on combating CC and building resilience in communities is a long and arduous process, and Nepal is no exception. Nepal's recent political and constitutional overhauls, combined with its aspirations to become a "prosperous middle-income country by 2030" (National Planning Commission, 2017) may potentially led to vulnerable rural communities being forgotten and their resilience building capacity given less focus than it requires by the government. Conversely, whilst Norway has achieved comparatively much higher levels of development and political stability than Nepal the predicted financial impacts, caused by increased rainfall alone, for private insurance agencies and the Norwegian government are estimated to be in the hundreds of billions of Norwegian Kroner (Norsk Vann, 2014). Therefore, a potentially efficient and cost effective approach to prepare communities towards the impacts of climate change induced environmental hazards across Nepal and Norway may be to focus on establishing and reinforcing community levels of resilience, whilst larger solutions to climate change are being tackled and implemented by national and international actors and governments.

1.4 Objectives and limitations

The main objective of this thesis is to assess how the chosen case communities in both Nepal and Norway can develop their community resilience towards local environmental hazards. Whilst this study examines communities in two separate countries, the focus will remain at a local level. The decision to focus the study on the local scale was made because of the varying affects CC has on communities globally as well as with in national boundaries. Every community is affected by CC in different ways due to factors such as resources available to the communities and the location of the communities. A desire to understand how rural communities globally, in both developed and developing countries, can properly prepare themselves for the future impacts of CC has contributed towards an aim of identifying the strengthens and limitations of the community resilience in the chosen case communities in Nepal and Norway. The importance of identifying such strengthens and limitations was highlighted in the community resilience manual created by the Canadian Centre for Community Renewal when they state that: "a key idea is that all communities have within them characteristics that can either enable or constrain their ability to adapt and change. Bringing these characteristics to conscious awareness is an important step in moving communities towards taking intentional action to influence their circumstances" (Canadian Centre for Community Renewal, 2000, Pp5). The possibility of developing community resilience through the identification of strengthens and limitations in communities has led to the following key objective for this study. This thesis aims to understand how ready the rural communities of Fulbari (Nepal), Patalekhet (Nepal), Rissa (Norway) and Byneset (Norway) are to cope with climate related hazards in their area and how these communities can further develop their resilience towards such hazards. More specifically this study set out to:

- Study and identify the local community's strengths and limiting characteristics which may influence their resilience towards local environmental hazards related to climate change.
- Analyse how the locals organise themselves before, and how they cope after an environmentally hazardous event related to climate change.
- Identify how the local authorities and NGO's have acted towards improving the community's resilience towards hazards related to climate change.

- Compare and suggest where potential developments would considerably increase the community's resilience towards climate change related hazardous events.

The primary purpose for this study is to examine what developments can be made to improve the strengthens and limitations of the studied communities in order to enhance their overall community resilience towards their local hazards related to CC. The chosen case communities from the two countries are also compared against one another to examine how the communities differ in their approach to preparing for the future impacts of climate change on their local area and on their livelihoods.

This study will concentrate on the social aspects of community resilience. By focusing on the social aspects of community resilience enables this study to conduct a meaningful comparison between the communities in Nepal and in Norway, given the vast differences in economic development between the two countries. Additionally, focusing on the social aspects of community resilience will highlight limiting factors which can be improved by community members themselves. Thus, this study will assess three dimensions of the social aspects which contribute towards community resilience, those being social capital, community capacity, and information & communication. These three dimensions are all independent of economic characteristics which therefore both allows for a fair comparison between the rural communities in Nepal and those in Norway.

Two case studies of rural communities from the central region of Norway and two case studies of rural communities close to the Kathmandu valley in Nepal is the focus of this study. These communities were examined for several reasons including their location and comparable factors. It is highly possible that the results of this study may vary for different case studies in different countries or even in different regions of both Nepal and Norway due to the vast variations climate change has on local areas as well as the different cultural settings in different communities. However, the methods and approach to analysing the strengthens and weaknesses of different communities would remain similar for those studies and where the environmental

hazards related to climate change are similar to those found in the case communities of this study it is most likely that complementary strengthens and limitations would emerge.

1.5 Organisation of the thesis

Chapter 1 has presented a brief description of the background for this thesis as well as the main objectives and the steps taken to achieve these objectives. In the next chapter, chapter 2, an arrangement and discussion of the relevant concepts for this study as well as the conceptual model applied to assess the strengths and limitations of the four communities will be presented. Additionally, information regarding the communities studied in this thesis will also be presented in chapter 2. Chapter 3 will define in more detail the methodological approach taken to identify, gather, and analysis the relevant data needed to gain a better understanding of the strengths and limitations present in the case communities in terms of social dimensions of community resilience towards hazards related to climate change. The findings from the interviews conducted in each of the 4 communities will be presented and discussed in chapter 4 of this thesis. Chapter 5 will analysis the data collected during this study and identify any strengths and/or limitations which currently exist in the communities with regards to hazards related to climate change. A comparison between the findings in Nepal and Norway will also be conducted in chapter 5 to determine whether or not there are any similar strengths and/or limitations currently present in terms of the social aspects of community resilience in the case communities towards hazards related to climate change. Furthermore, chapter 5 will discuss the potential for transferring the knowledge and experiences of a particular community studied in this thesis which poses greater strengths or reduced limitations towards a shared weakness into that of another less resilient community. Finally, the conclusion in chapter 6 will readdress the main objective of this thesis and provide a summary of the study's key findings.

2 Key Concepts and Presentation of the Study Areas

Chapter 2 presents the key concepts and models used in this thesis to study community resilience towards the impacts the hazardous impacts of climate change in rural communities of Nepal and Norway. Also presented in this chapter are descriptions of the two countries Nepal and Norway and the four case communities of Patalekhet, Fulbari, Rissa, and Byneset with regards to the impacts of climate change.

2.1 Key concepts

2.1.1 The concept of community

With the main objective of this thesis focusing on how community resilience can be enhanced to prepare rural communities for the impacts of climate change, the concept of 'community' is at the heart of this study. In recent years many different sociologists and sociological studies have attempted to define their own concept of community and therefore today there are numerous different definitions for 'community' which have emerged, and which may sometimes contradict each other. The majority of these modern definitions of 'community' are strongly linked with the analyses of earlier scholars such as, one of the founding fathers of the sociology of community, Ferdinand Tonnies who begun by attempting to understand the rapid industrial changes occurring across Europe in the late 19th century. Through his thoughts and writings, Tonnies made famous the German words 'gemeinschaft' and 'gesellschaft'. Tonnies used the term 'gemeinschaft' meaning 'community' to refer to a more romanticised traditional and agrarian way of life and contrasted it with the German term 'gesellschaft' meaning 'society' which he used to refer to the impersonal, superficial modern urban life (Slattery, 2003). Tonnies' definition of 'community' is highly important given that he is one of the founding fathers of the sociology of community and therefore is often the base upon which modern sociologists construct their own definitions of community. Tonnies' definition of 'community' or 'gemeinschaft' originates from the idea of traditional village communities which had a stable social order governed by a homogenous

culture (Slattery, 2003). Whilst this thesis is focusing on rural communities, the cultural make up of these communities, especially those in Nepal, are rarely homogenous and thus this study must take into account the various definitions of 'community' and apply the most appropriate description to this study. Therefore, for the purposes of this thesis the term 'community' will follow the definitions established by Agrawal and Gibson. Agrawal and Gibson have dedicated themselves to the study of the sociology of community and have narrowed the idea of community down to three overlapping concepts. To them a community can be defined by one or all three of a "small spatial unit, a set of shared norms, or a homogenous social structure" (Agrawal & Gibson, 1999).

Given that, as previously mentioned, the communities assessed in this thesis are so diverse in caste, ethnic, racial and religious backgrounds this study cannot define a community as a homogenous social structure. Therefore, this study shall focus on the "small spatial unit" definition of community given by Agrawal and Gibson and shall look at how people living in a shared small spatial unit interact and support each other to assess the level of community resilience in the four cases communities.

2.1.2 How to measure resilience

The main aim of this thesis is to understand how prepared the selected rural communities in Nepal and Norway are to manage climate related hazards and how they can develop their resilience towards these hazards. Therefore, it is important that this thesis defines what it classifies the term "resilience" as. Egeland describes resilience as "the capacity for successful adaptation, positive functioning, or competence despite high-risk status, chronic stress, or following prolonged or severe trauma" (Egeland, 1993, Pp 517). It is the ability to handle immense pressure and a process which provides altered and improved outcomes. Paton and Johnston highlight a number of components which contribute towards resilience such as personal and environmental characteristics. They also stress the importance that a sense of community has on enabling communities to "bounce back" after a damaging event (Paton & Johnston, 2001). However, the discussions around how to accurately and efficiently measure resilience are still

ongoing. Traditional methods of measuring resilience such as Strengths, Weaknesses, Opportunities, Threats (SWOT) analysis promote a quantitative research approach to determine resilience. Recently, this traditional approach has been built upon but some researchers, such as Susan Cutter, who argue in favour of using a quantitative approach to assess resilience. The approach taken by Susan Cutter examines six baselines of community resilience (see table 1 for more details) and then provides each baseline with a rank, which is used to score the overall resilience of a community (Cutter et al., 2008). Whilst, Susan Cutter's new approach and the traditional SWOT analysis approach both utilise quantitative analysis and are a widely cited as efficient approaches for the measurement of resilience, there are still others who argue that in some instances it may be more appropriate to apply a qualitative approach and will therefore provide a more accurate measurement of resilience.

The Canadian Centre for Community Renewal suggests that by creating a community portrait researchers can more accurately measure the resilience of their community. They describe a community portrait as a "description of a community from the perspective of resilience" (Canadian Centre for Community Renewal, 2000). A community portrait can in some ways be linked to more traditional methods of measuring resilience such as Strengths, Weaknesses, Opportunities, Threats (SWOT) analysis, however, some key differences which exist. Primarily, the most important difference is that a community portrait involves applying a qualitative research approach. This type of approach is better at gathering information and understanding the perceptions of a community as well as their attitudes and feelings towards a particular issue. Secondly, this community portrait approach bases its assessments off of empirical data collected from a specific community. Empirical data provides a more detailed understanding of what exactly makes the examined community more or less resilient and "helps reveal how various characteristics of the community are interrelated" (Canadian Centre for Community Renewal, 2000). It is possible that several features may collaborate to either enable or constrain resilience in a community. Therefore, a community portrait provides a more explicit understanding of where the linkages of these features are and how they influence each other. This understanding is very important to identifying which characteristics of the community should be enhanced in order to improve resilience.

Table 1: Community resilience indicators as devised by Cutter et al. (2008.Pp 604).

Dimension	Candidate variables
Ecological	- Wetlands acreage and loss - Erosion rates - Percentage of impervious surface - Number of coastal defense structures
Social	- Demographics (age, race, class, gender, occupation) - Social Networks and social embeddedness - Community values-cohesion - Faith-based organisations
Economic	- Employment - Value of property - Wealth generation - Municipal finance/revenues
Institutional	- Participation in hazard reduction programs (NFIP, Storm Ready) - Hazard mitigation plans - Emergency services - Zoning and building standards - Emergency response plans - Interoperable communications - Continuity of operations plans
Infrastructure	- Lifelines and critical infrastructure - Transportation network - Residential housing stock and age - Commercial and manufacturing establishments
Community Competence	- Local understanding of risk - Counseling services - Absence of psychopathologies (alcohol, drug, spousal abuse) - Health and wellness (low rates mental illness, stress-related outcomes) - Quality of life (high satisfaction)

2.1.3 Community resilience

There are many similarities between resilience and community resilience because the close relationship between the two concepts, however, there are some important differences which must be emphasised.

Definitions for individual and community resilience are very closely related. The description for resilience, "the capacity for successful adaptation, positive functioning, or competence despite high-risk status, chronic stress, or following prolonged or severe trauma", given earlier by Egeland (1993, Pp 517) defines resilience for an individual. Whilst Pfefferbaum et al. (2005, Pp 349), defines community resilience as "the ability of community members to take meaningful, deliberate, collective action to remedy the impact of a problem, including the ability to interpret the environment, intervene, and move on". The defining difference between the two definitions of resilience is the collective action of multiple members of a community to overcome adversity. Therefore, when discussing community resilience this study will refer to the ability of the entire community to take meaningful collective action towards hazards related to climate change rather than focusing on the resilience of individuals within the community. The ability of the community to collaboratively work together is important in the resilience building process because even if individuals inside of the community have a considerable level of resilience it may not contribute towards the resilience of those in the rest of the community (Norris et al., 2007). Therefore rather than focusing on the development of individuals in the community to build community resilience it is more important to foster a sense of community within members of the community as this feeling of belonging is likely to construct a stronger support network which increases involvement in community disaster responses (Bergstrand et al., 2015). This community involvement is an important aspect of effective community resilience. As Coles and Buckle (2004) mention, for effective recovery to occur in communities after a disaster it is a necessity that members of the community actively participate in the recovery process and have the knowledge, skills, and capacity to contribute in a meaningful way. These community interactions, among other things, make up part of the social systems necessary for a community to become more resilient. Figure 1 illustrates the importance that social systems plays in contributing towards community resilience (Cutter et al., 2008, Pp 602). In this graphic

representation of the disaster resilience of place Cutter et al. the nested triangles represent the precursory conditions which both inherent vulnerability and inherent resilience in a community consist of. “Social systems” is positioned as one of the three sides of the larger triangle and represents a key exogenous factor which influences inherent vulnerability and inherent resilience in communities. The fact that Cutter et al. place “social systems” as one of the three fundamental aspects of community resilience illustrates how important social arrangements at both a local and broader level are in determining community resilience. Also highlighted in figure 1 is the role that social learning plays in improving the resilience of a community in the future.

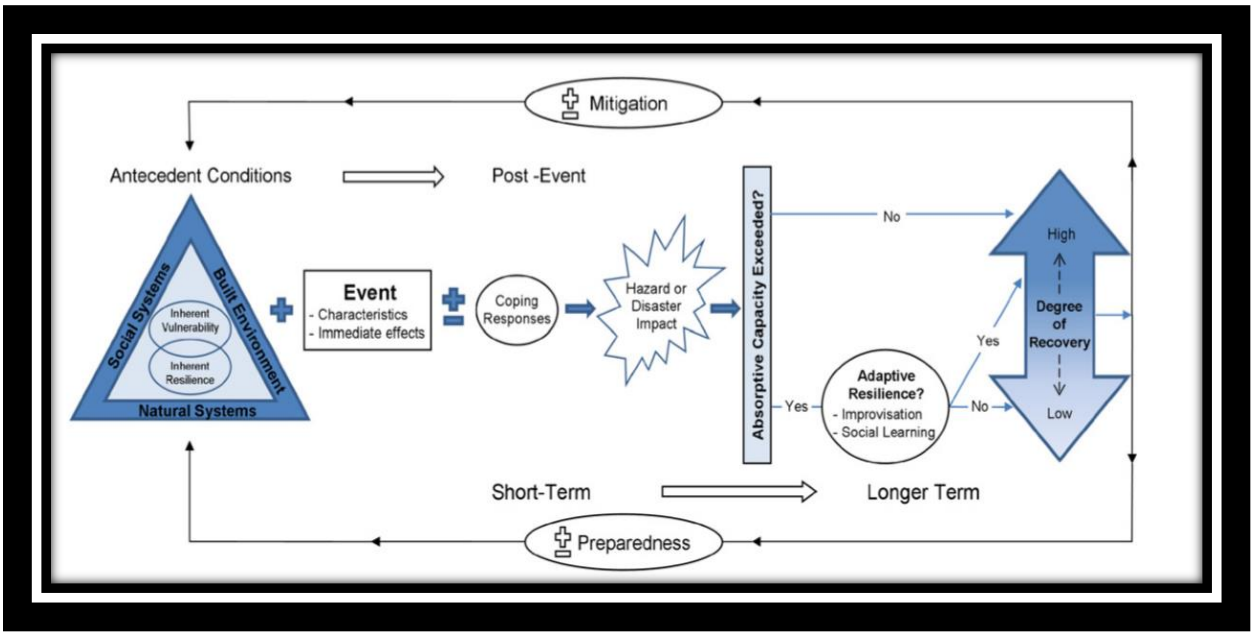

Figure 1: Graphic representation of the disaster resilience of place (Cutter et al. 2008.Pp 602).

Given the evident stressed importance of the social aspects of resilience from literature reviews, this study shall focus on the social aspects of community resilience and how by assessing their strengths and limitations a community can improve their levels of resilience in the future to become better prepared to deal with future environmental hazards related to climate change. In addition to the explicit emphasis put on social systems as a key factor in community resilience, this study also decided to focus on social aspects of community resilience as they permit municipalities and local community members to implement changes and develop their own levels of community resilience autonomously.

Therefore, by providing communities with an approach which allows them to improve their own community resilience will most likely help build resilience in communities faster. Implementation speed is an essential factor now in building resilience in communities due to the urgent nature of the potential hazardous effects related to CC and especially in Nepal given that it is already regarded as a highly at-risk developing country.

Finally, it was decided that, due to the polarised levels of development between Nepal and Norway, it would be injurious for this study to try to compare the economic and/or infrastructural dimensions of resilience in these communities. Therefore, social aspects of resilience provide the most meaningful comparison of the strengths and limitations present in the selected communities.

This thesis will focus on identifying the strengths and limitations of the social dimensions of community resilience towards hazards related to climate change in four selected communities. In order to assess the social aspects of community resilience this thesis will utilise and combine a number of the measurement techniques addressed in section 2.1.2. Firstly, this thesis shall use three of the baselines presented in table 1 as indicators for community resilience; social, institutional, and community competence. The other three baselines, economic, infrastructure, and ecological will not be a focus of this study as they focus less on the social aspects of community resilience, however, they may still be casually examined when it is appropriate to do so. Through the use of the three baselines utilised (i.e. social, institutional, & community competence) it has been possible to divide community resilience into three measurable dimensions, namely social capital, information & communication, and community capacity, illustrated in figure 2. Figure 3 provides a visual representation of how this the combination of baseline indicators devised by Cutter et al. will be combined with the three dimensions of community resilience assessed in this thesis. However, whilst this study shall adopt and use three of the baseline indicators presented by Cutter et al., it will not conduct a quantitative analytical approach. Rather this study shall combine the Cutter et al. baseline indicators with a community portrait analytical approach and conduct qualitative analysis. Given the small sample size (4 community cases) and the fact that community resilience can be best understood as the result of

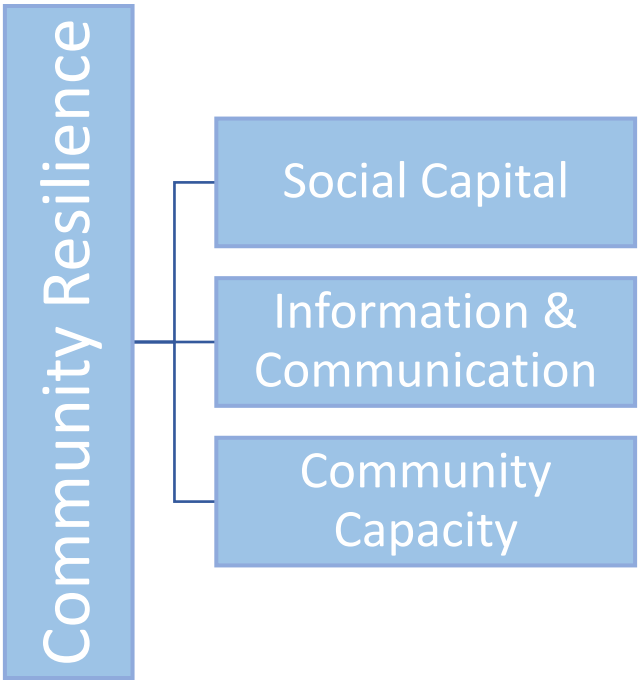

Figure 2: The three dimensions of community resilience which were examined in this study.

multiple factor combinations (Mishra et al., 2017), a conventional quantitative statistical methods approach suggested by Cutter et al. and the traditional SWOT analysis was ruled out for this thesis.

Through this combination of baseline indicators developed by Cutter et al. (2008) and the community portrait analytical approach suggested by the Canadian Centre for Community Renewal (2000) this thesis aims to uncover the limitations and strengths within the Fulbari, Patalekhet, Rissa, & Byneset communities regarding community resilience towards hazards related to climate change. This thesis will examine social capital and relations between community members and the community. By learning from the experiences of the community members and their attachment to the community that they live in we can understand why the members of these communities continue to live in these hazardous areas. Furthermore, community resilience is affected by the level of communication and collaboration between individual members of the community before, during, and after a hazardous event. Assessing social capital in this study can reveal the level at which community members interact with each other and therefore gain a better understanding of the current levels of community resilience in

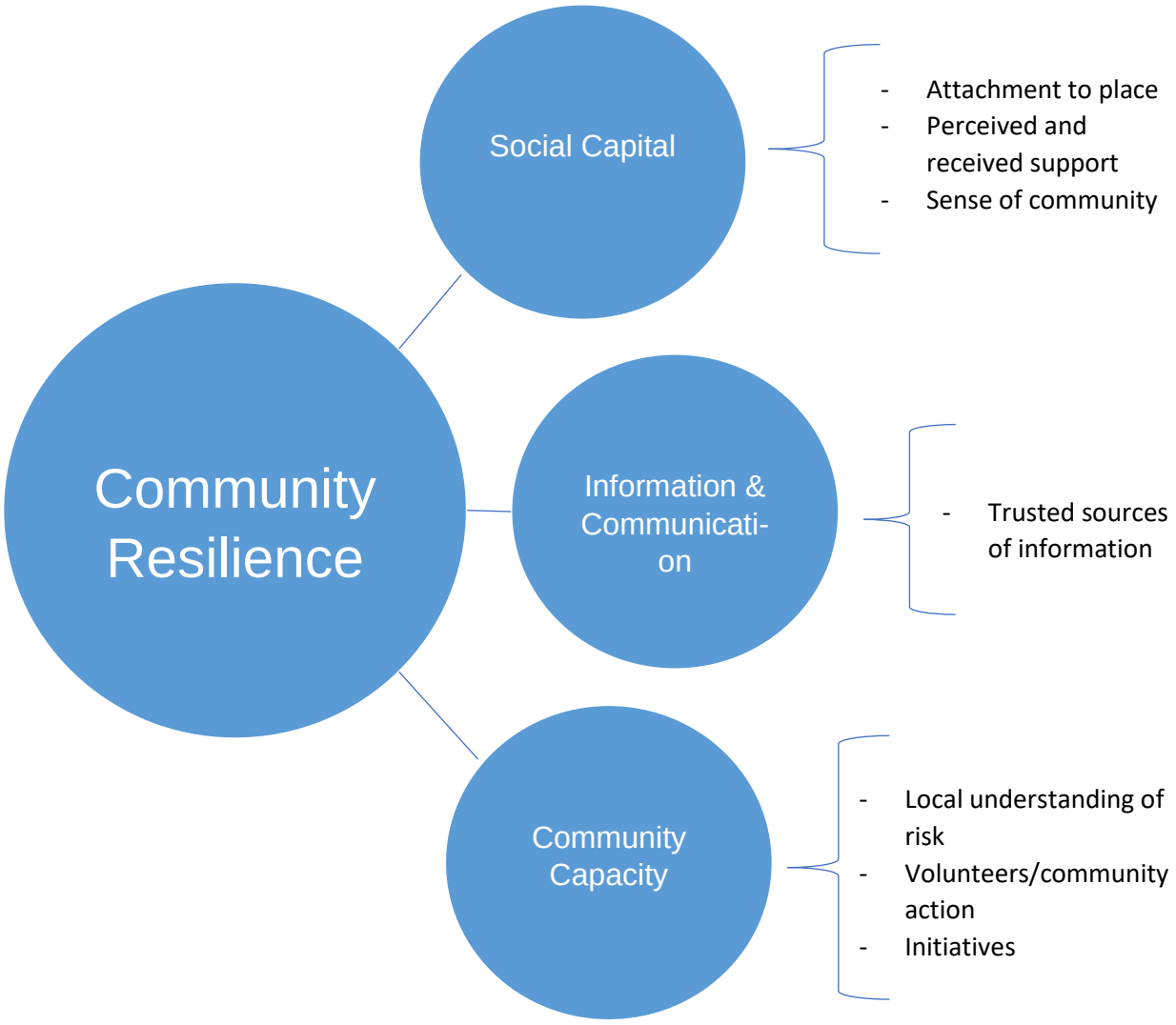

Figure 3: Illustration of the modified combination of table 1 and figure 2.

the community. According to the UNDP social capital is measured by "the levels of trust, cooperation and reciprocity in a social group" and plays the most important role in determining the actual resilience to an environmental hazard (UNDP, 2004). Local level community response continues to be the key factor which enables people to minimize and endure risks associated with climate change.

Additionally, examining the capacity of the community as a whole can reveal how prepared a community is to deal with a particular hazard related to climate change. If a community has its own resilience capacity towards climate change related hazards then it is more likely to recover

to pre-disaster levels faster than communities which do not (Canadian Centre for Community Renewal, 2000). Additionally, Cutter et al. (2008) stress the importance of capacity of the community to engage in social learning on order to learn from past experiences and build upon these experiences in the future. Thus, community capacity is considered a central aspect of community resilience and is therefore included in this study.

Lastly, it was an interest to this study to examine how information regarding hazards related to CC is exchanged amongst the community as well as between the community and local actors. As previously mentioned, the communication of information is vitally important to the resilience of a community towards CC related hazards before, during, and after an event. According to Masterson et al. (2014), an engaged and well-informed community is better equipped to provide support before, during and after an environmental hazard than any other. Furthermore, the way that people interact and communicate has dramatically changed over recent years thanks to the advancement of technology. Therefore, this study is also interested in how communities maintain communications and share information, and if this has been impacted by the introduction of technology over recent years. Thus, a measurement of information and communication was included in this study.

2.2 Presentation of the study areas

The empirical data collected for this study is constructed from the case studies in the two Nepalese communities, Patalekhet and Fulbari, and the two Norwegian communities, Rissa and Byneset. The following section presents a background of the two countries, Nepal and Norway, and describes the four chosen case communities.

2.2.1 Nepal

Nepal is a landlocked South Asian country, situated mostly in the Hindu Kush Himalaya. Nepal has a unique and varied topography, from the flat river plains in the south, to the hilly central region, up to its northern mountainous area, which contains some of the highest peaks on Earth including Mount Everest (the world's highest point at 8,848 metres above sea level), Nepal ranks

as the second highest country in the world in terms of average elevation above sea level (3,265 metres) falling only slightly behind Bhutan (3,280 metres) (PSU, n.d.). Recent studies have shown that mountainous areas, areas which are 4,000 metres or more above sea level, are experiencing temperature rises at a faster rate than low-lying areas[1]. Therefore, given that Nepal has an average elevation above sea level relatively close to 4,000 metres and contains vast swathes of land above 4,000 metres it is highly likely that many communities in the country are already feeling the climatic impacts associated with these accelerated rates of temperature rises. Recent studies have shown that the effects of such accelerated temperature rises in Nepal are likely to have a dramatic impact on the frequency and severity of climate related hazards, especially droughts, floods, and crop failures (Karki, Mool, & Shrestha, 2009; Bharati et al., 2014; Chaudhary & Aryal, 2009). In Nepal an increase in seasonal change is expected. It is predicted that annual precipitation rates will rise but the periods over which it falls will decrease (Shrestha et al., 2000). These unevenly distributed and intense rainfall events are predicted to put communities across Nepal under tremendous risk of reoccurring and extreme rainwater led flash floods, evidence of such risks can already be seen during July of 1993 when three days of torrential rainfall in central Nepal triggered disastrous landslides, major flooding, and resulted in one of Nepal's worst natural disasters on record (Mirza, 2011). Accelerated temperature rises also risk the increased rates and intensity of glacial lakes outburst flooding (GLOF) for Nepalese communities in the short term (Agrawala et al., 2003). In the long term, despite an expected increase in annual precipitation rates, the periods of drought throughout the year are predicted to last longer, thus increasing the vulnerability of rainwater dependent agricultural communities across Nepal (Dahal et al., 2016). Information from the Intergovernmental Panel on Climate Change (IPCC) has shown that temperature rises have a direct impact on the productivity of crop yields. Their research revealed that a 1-degree Celsius increase in global temperatures will led to a 5% decrease in grain yields[2]. Thus, by combining the rapid rates of temperature rises in mountainous regions with the evidence that temperate rises decrease grain yields poses a

[1] In the past 20 years the temperature of the world above 4,000 metres has increased at a rate of 75% faster than areas below 2,000 metres (Mountain Research Initiative EDW Working Group, 2015).

[2] From 1880 to 2012, average global temperature increased by 0.85°C. To put this into perspective, for each 1 degree of temperature increase, grain yields decline by about 5 per cent. Maize, wheat and other major crops have experienced significant yield reductions at the global level of 40 megatons per year between 1981 and 2002 due to a warmer climate (United Nations, 2018).

potentially very serious food shortage threat in the near future for communities in Nepal and across the greater HKH region.

Currently the government of Nepal along with many national governments and International Non-Governmental Organisations (INGO) from around the world are working to build up resilience levels in vulnerable communities in Nepal and across the HKH. ICIMOD is one of the most influential INGO's in this field and under their "Resilient Mountain Solutions" (RMS) program they are working in accordance with the 2015 Paris Agreement, contributing towards understanding, enhancing, and supporting "resilience of communities, livelihoods and ecosystems" (UNFCCC, 2015)[3]. Enhancing, and supporting the resilience of communities, livelihoods and ecosystems in Nepal and across the HKH region is crucial not only due to the pre-existing levels of vulnerability in certain communities and the predicted increased likelihood and ferocity of hazardous related to CC but also because the countries which are either partially or entirely situated in the HKH region are amongst some of the least developed and most at risk countries in the world. Nepal is one of eight countries which are either partially or entirely situated in the HKH region, with the remaining seven countries being: Afghanistan, Bangladesh, Bhutan, China, India, Myanmar, & Pakistan. Table 2 combines different international scales of measurement for the various levels of development across the eight HKH regional countries (see also Appendix D for global averages). The United Nations Development Programme (UNDP) developed its own ranking system, called the Human Development Index (HDI), which uses life expectancy, educational attainment, and income as variables to obtain a greater understanding of the quality of human life within countries. Currently there are 193 member states of the UN. Of these 193 countries, 189 have been ranked on the UNDP's 2017 HDI (UNDP, 2018). Opposite to the UNDP's 3 step assessment of the quality of human life in countries, the World Bank uses one main measurement statistic to classify the development of the 189 countries measured. The World Bank's measurement for development ranks the national economy of each country according to the annual gross national income (GNI) per capita using the Atlas Methodology. Countries are then sorted into four groups based on their GNI per capita: Low-Income, Lower Middle - Income, Upper Middle - Income, High – Income (see Appendix D for the World Bank's country income status breakdown) (World Bank, 2018b).

[3] Paris Agreement, Article 8, Section 4, Sub-section h. (UNFCCC, 2015)

Table 2: Countries which belong to the HKH region with their corresponding level of development using various international scales of measurement (UNDP, 2018) (World Bank, 2018a).

Countries	*HDI & Rank (out of 189 countries)*	*Level of Human Development Based on HDI Rank*	*World Bank GNI Per Capita (US$) & Rank (out of 189 countries)*	*World Bank Country Income Status*
Afghanistan	0.498 (168)	Low	570 (178)	Low
Bangladesh	0.608 (136)	Medium	1,470 (150)	Lower-middle
Bhutan	0.612 (134)	Medium	2,720 (131)	Lower-middle
China	0.752 (86)	High	8,690 (70)	Upper-middle
India	0.640 (130)	Medium	1,820 (144)	Lower-middle
Myanmar	0.578 (148)	Medium	1,190 (157)	Lower-middle
Nepal	0.574 (149)	Medium	790 (167)	Low
Pakistan	0.562 (150)	Medium	1,580 (147)	Lower-middle

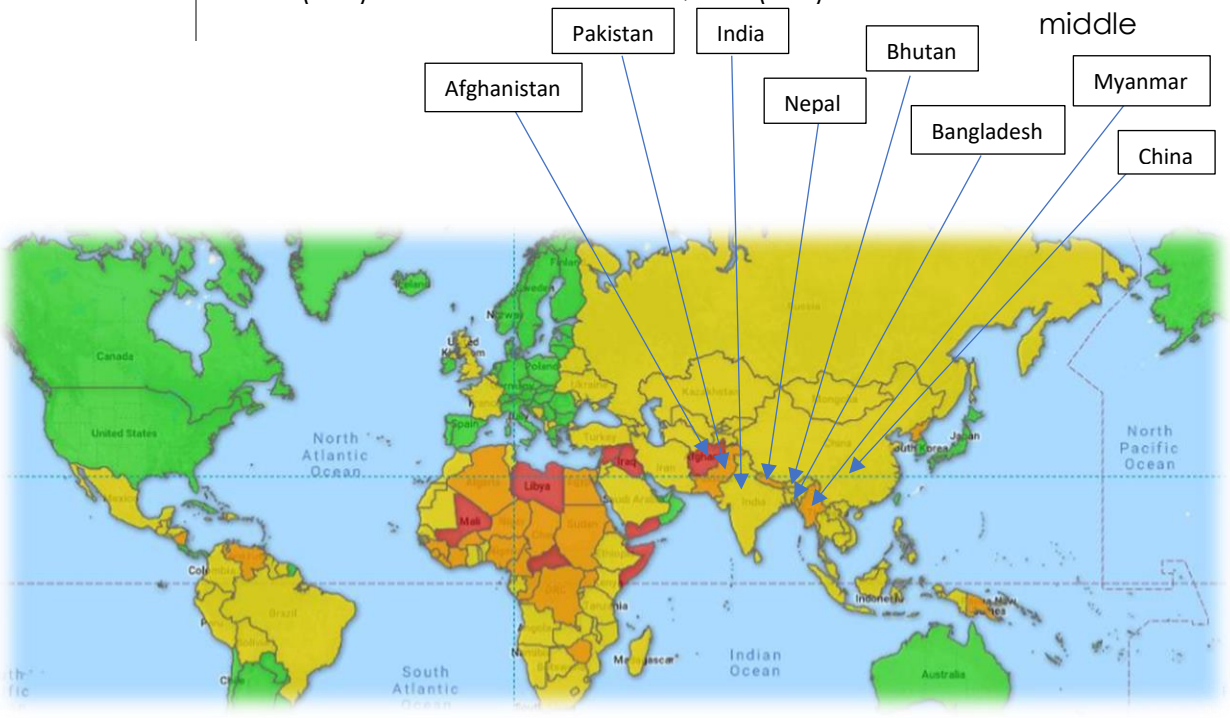

Figure 4: The risk rating of most countries on the world map (Source: Global+Rescue, 2018). The severity of risk ranges from green to red (Green = Low Risk; Yellow = Moderate Risk; Orange = High Risk; Red = Extreme Risk).

Table 2 shows that all of the countries in the HKH region, with the exception of China, are ranked in the lowest third of the 189 countries measured on both the ranking lists for the UNDP HDI and the World Bank GNI per capita, with Nepal ranking 149th and 167th respectively. In addition to being amongst some of the lowest ranked countries in terms of development, figure 4 highlights that Nepal and the other HKH regional countries are also amongst some of the most at-risk countries in the world. Risk ratings in figure 4 are based off the levels of unrest, violence, health, and environment in each country. From figure 4 we can see that Nepal is at a high-risk level along with Myanmar and Pakistan, whilst Afghanistan is at an extreme level of risk.

2.2.2 Patalekhet and Fulbari

Both of the Patalekhet and Fulbari communities are situated within the Kavrepalanchok district, which borders the Eastern rim of the Kathmandu valley in Province 3 of Nepal. Table 3 provides some background information regarding the size of the Kavrepalanchok district, with regards to its geographical area and population size, whilst figure 5 visually shows the location and size of the district compared to the rest of the districts of Nepal.

As previously stated, there was very little information specifically about the Patalekhet and Fulbari communities available, especially in English, and therefore the information compiled in tables 3, 4, & 5 is sourced from a broad 2015 Compendium of Environmental Statistics for Nepal, published in 2016 by the Central Bureau of Statistics from the Government of Nepal. This compendium was the most recent publication with statistical information for these two communities relevant to this thesis, at the time of writing. It proved to be a very useful source of background statistical information regarding Patalekhet, Fulbari and the greater Kavrepalanchok district as a whole but provided less of an insight into the specific strengths and/or challenges of these communities. However, whilst such specific information regarding strengths and/or challenges specific to Patalekhet and Fulbari may exist in reports or documents published by the Government of Nepal, due to the language barriers of this study such information was not available.

Figure 5: The location and size of the Kavrepalanchok district in relation to the other 76 districts of Nepal.

Tables 3 & 4 were created through the compiling of statistical information available in the 2015 Compendium of Environmental Statistics for Nepal (Central Bureau of Statistics, Government of Nepal. 2016) in order to provide relevant background information about the makeup of the Kavrepalanchok district in terms of land and population size. Certain relevant statistical data specifically for the Patalekhet and Fulbari communities were not presented in the 2015 Compendium of Environmental Statistics for Nepal (Central Bureau of Statistics, Government of Nepal. 2016), and therefore tables 3 & 4 compiled data based on the averages of all of the communities which make up the Kavrepalanchok district. Through the gathering of the total number of "registered land", the number of agricultural farmlands registered with the government, and the total area of "registered land" for Kavrepalanchok table 3 calculated that the average agricultural landowner in Kavrepalanchok owns 11.33 Ropani or roughly 5,764m^2 of land. Due to the fact that the average agricultural landed area owned has not been documented for either the entire district or this study's two individual communities in this compendium, this study will use the average land owned for the whole of Kavrepalanchok in table 3 as the average for the Patalekhet and Fulbari communities. Whilst table 3 presents information regarding the

size of Kavrepalanchok in terms of geographical area, table 4 provides this study with information regarding the size of the district in terms of population. Table 4 shows that there over 16,000 more women in the Kavrepalanchok district than men. Combining this statement regarding the demographic makeup of the district with the Annual Population Growth Rate of -0.1%, provides evidence to support the claim that men are out-migrating from these rural communities to find work in other locations, such as the nearby city of Kathmandu. Similarly, table 5 reveals that the female population is higher than the male population in the two selected case communities of Patalekhet and Fulbari. The figures show that there over 100 more females than males in Patalekhet and exactly 300 more females than males in the community of Fulbari. These figures further illustrate the importance of interviewing and understanding the experiences and opinions of women for this study as they make up the majority of the population in both communities. Furthermore, given that the reason behind their majority is mostly due to the outmigration of young men from the communities, it was also important to gain an insight and an understanding behind the motivations of the youth to leave the communities and therefore the target respondent group of 18-35 year olds was constructed and used for this study.

Table 3: General information about Kavrepalanchok (Central Bureau of Statistics, Government of Nepal. 2016).

District	Area (sq.km.)	Registered Land		Average Land Owned (Ropani)*[2]
		Number	Area (Ropani)*	
Kavrepalanchok	1,396	68,872	780,520.811	11.33

*The statistic available for "Area" of registered land from the Government of Nepal's 2016 published statistics was originally in (ha), however, for the purpose of this study the "Area" was converted using the conversion ratios below:

1ha = 10,000m^2 1Ropani = 508.74m^2

*[2] The "Average Land Owned (Ropani)" in table 3 was not available in the compendium and therefore was calculated by dividing the "Area (Ropani)" of land registered by the "Number" of registered lands to give the figure 11.33.

Table 4: Information regarding the population and makeup of the Kavrepalanchok district (Central Bureau of Statistics, Government of Nepal. 2016).

Population Size		Annual Population Growth Rate (%)	Population Density (Persons/ km^2)	Number of Households	Average Household Size
Male	Female				
Overall					
182,936	199,001	-0.1	274	80,720	4.73
381,937					

Table 5: Information regarding the makeup of the two Nepalese communities studied (Central Bureau of Statistics, Government of Nepal. 2014).

Community	Population Size		Number of Households	Average Household Size	Literacy Rate of Population Aged 5 & Over (%)
	Male	Female			
	Overall				
Patalekhet	1,946	2,063	806	4.97	74.16
	4,009				
Fulbari	2,079	2,379	973	4.58	71.06
	4,458				

As previously mentioned, the 2015 Compendium of Environmental Statistics for Nepal (Central Bureau of Statistics, Government of Nepal. 2016) proved to be a highly beneficial source of information regarding the background statistical data of the Patalekhet and Fulbari communities. However, it was unable to assist in identifying or highlighting specific strengths and/or weaknesses of the two communities. For example, the statistics available in this compendium fail to illustrate the environmental shocks and stresses related to climate change that the Patalekhet and Fulbari communities have experienced either in the past or in recent years. Conversations

with, Programme Coordinator of the Resilient Mountain Solutions Initiative at ICIMOD, Nand Kishor Agrawal revealed that these communities have in recent years already experienced a reduction in rainfall outside of the monsoon seasons, as well as increased unpredictable rainfall periods which have in turn led to more regular occurrences of severe droughts. Nand Kishor Agrawal also informed this study that these negative stress effects related to the slow onset of progressively lower levels of available water have led to increasing rates of out-migration from these communities. In addition to the challenges presented by slower stresses, these communities have also experienced rapid sudden shocks in recent years.

Like many communities across Nepal, the communities in Patalekhet and Fulbari experienced the unexpected shock of a 7.8Mw magnitude earthquake in 2015. From the 25th of April until the 31st of December 2015 communities across Nepal were struck by 421 earthquakes with magnitudes ≥ M4 (Shrestha et al, 2016). The main 7.8Mw magnitude shock on the 25th of April had its epicentre at the Barpak Village Development Committee (VDC) in the Gorkha district of Nepal and is therefore often referred to as Gorkha Earthquake. The Gorkha Earthquake was the largest earthquake to hit Nepal since the Nepal-Bihar Earthquake in 1934 (Government of Nepal: Ministry of Home Affairs, 2015). It is estimated that almost one third of Nepal's population were affected by the 2015 earthquake and its aftershocks, with more than 8,800 casualties, 22,00 injuries, and over 100,000 internally displaced people (NPC, 2015b). According to the National Planning Commission (NPC) the 2015 earthquake and its resulting aftershocks forced an additional 2.5-3.5% of Nepal's population into poverty, which is approximately 700,000 people, as their homes and livelihoods were either partially or completely destroyed by the force of the earthquakes (NPC, 2015b). With almost all sectors of Nepalese society seriously affected, the estimated total economic cost of this disaster to Nepal is USD 7 billion (Shrestha et al, 2016). Of the 77 districts that make up Nepal, the NPC identified 31 districts affected by the earthquake with Kavrepalanchok being recognised as "crisis hit" (NPC, 2015a). Many communities in Kavrepalanchok, including Patalekhet and Fulbari, were immeasurably negatively impacted by the 2015 Gorkha Earthquake and its resulting aftershocks with individuals experiencing lasting physical, psychological, livelihood, and property damages.

2.2.3 Norway

Recent studies show that in the future Norway is likely to experience more extreme weather events as a consequence of climate change (NCCS, 2017). Similar to Nepal, Norway is expected to see accelerated temperate rises with the worst prediction from the Intergovernmental Panel for Climate Change (IPCC) under an RCP8.5 scenario (Representative Concentration Pathway with the highest greenhouse gas emissions) envisioning the annual temperature of Norway rising by approximately 4.5 degrees Celsius by the end of the century (NCCS, 2017). Whilst the 2017 NCCS report analyses greenhouse gas emissions and gives scientifically calculated predictions about the future impacts of climate change on Norway given various different global scenarios, it has also shown that climate change is having direct impacts on the weather in Norway right now. The report highlights that Norway is already experiencing an 18% higher annual rainfall average than it was 115 years ago. This increase in annual rainfall in Norway has already been affecting many farms and homes in recent years, which have been either damaged or destroyed by flooding as they struggled to cope with the increased water levels. Figures from Finans Norge show that in 2017 the Agricultural Directorate paid out 74.8million Norwegian Kroner as compensation for damages caused by flooding that were not covered by ordinary, private insurance (Finans Norge, 2018). The 2017 NCCS report goes onto say that by the end of the century average annual rainfall in Norway is predicted to increase by another 18% leading to an almost 60% increase in floods caused by rainfall events under an RCP 8.5 scenario. Figure 6, from the 2017 NCCS report, shows the predicted percentage change of flooding in Norway for medium and high emissions scenarios. What is clear from this figure is that the areas of Norway which have experienced predominantly snowmelt flooding events, mostly areas in Northern Norway, will witness a reduction in the overall number of flooding's that they experience. Areas that are predominantly dominated by rainfall flooding events, mostly in Western and Central Norway, will however experience an increase in flooding events in the future. Therefore, it is expected that floods in Norway which are induced by rainfall will increase in magnitude and will occur more frequently as a result of the higher rates of annual precipitation caused by CC (NCCS, 2017).

The consequences of higher annual rainfall averages in Norway caused by CC will not only

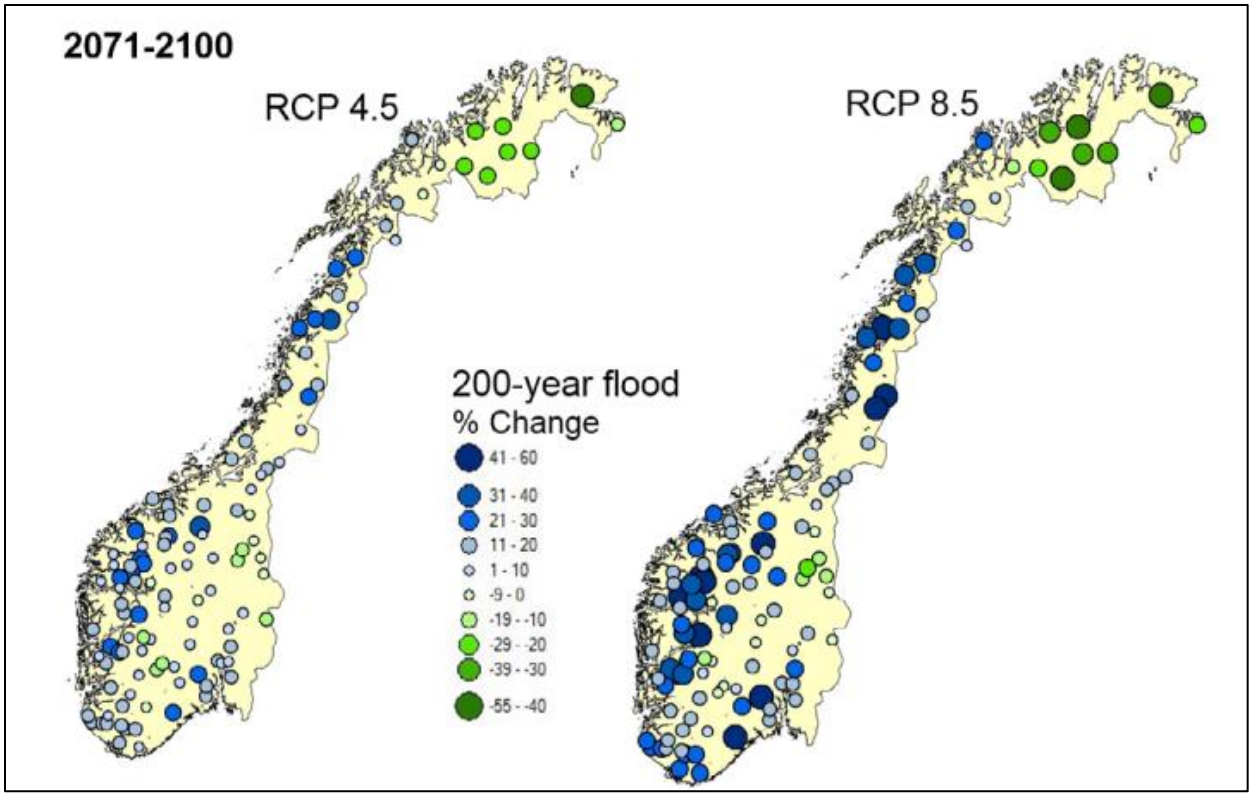

Figure 6: Shows the percentage change in the 200-year flood for Norway between the reference period of 1971-2000 and the future 2071-2100 period. Left image showing percentage changes for medium RCP4.5 emissions scenario and right showing for high RCP8.5 emissions scenario. Green indicates a decrease and blue an increase in flood magnitude (NCCS, 2017, Pp 31).

impact communities through more extreme and frequent rainwater flooding but also through other localised environmental hazards such as landslides and avalanches. Studies from the Norwegian Geotechnical Institute (NGI) suggest that the effects of increased precipitation levels in Norway will cause a rise in the number of landslide and avalanche events in the future and possibly even in areas which have not experienced such events previously. This is because weather events such as periods of extreme rainfalls, especially in steep terrains, can trigger certain types of slides and avalanches, such as landslides, debris slides, and slush avalanches (NGI, 2013). Furthermore, whilst most quick clay slides are not normally naturally occurring and are instead caused in the majority of cases by human activity, their occurrence in Norway may also increase in the future as more frequent flooding events may lead to greater levels of erosion which could therefore trigger more quick clay slide events (NCCS, 2017).

2.2.4 Rissa and Byneset

Both of the Rissa and Byneset communities are situated within the Trøndelag county of Norway.Trøndelag county is made up of 48 individual municipalities and is situated in central Norway. Of these 48 municipalities the studied communities of Rissa and Byneset belong to the municipalities of Indre Fosen and Trondheim, respectively. Figure 7 highlights these two municipalities, which visually shows the geographical location and size of the municipalities compared to the other 46 in Trøndelag. Trøndelag was formed in 2018 from the merger of Nord-Trøndelag and Sør-Trøndelag. Both Rissa and Byneset are part of municipalities which are located in Sør-Trøndelag. Given that both Rissa and Byneset are small rural communities inside municipalities which make up a county, often there is not a lot of specific data or statistics available on these communities. The current population size of Byneset is unknown however rough calculations, based off of 1960's figures and the average population growth rate for rural areas in the municipality, would estimate that around 2,500 people live in the Byneset community. For Rissa the data available, whilst not current, is a lot recent than compared to the Byneset community. The latest figures for the Rissa community show that in 2017 the population was 6,628 (Statistisk Sentralbyrå, 2019). Also available for Rissa was the net migration of individuals in the Rissa community from 2007 – 2017, this information has been presented in table 6. Table 6 suggests that the population of the Rissa community often fluctuates quite a lot between years of consistently high positive net migration rates to consistently negative net migration rates.

Rissa is in the southern end of the Indre Fosen peninsula, whilst Byneset is located west of the Nidelva River which runs from south to north down the middle of the Trondheim municipality. Although there was not a lot of information available in English regarding the impact that climate change has had on these communities, through communications with the Sør-Trøndelag

Table 6: Net migration of the Rissa community from 2007 to 2017 (Statistisk Sentralbyrå, 2019).

Net Migration										
2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017
-1	33	43	101	1	120	-4	28	-37	-13	-10

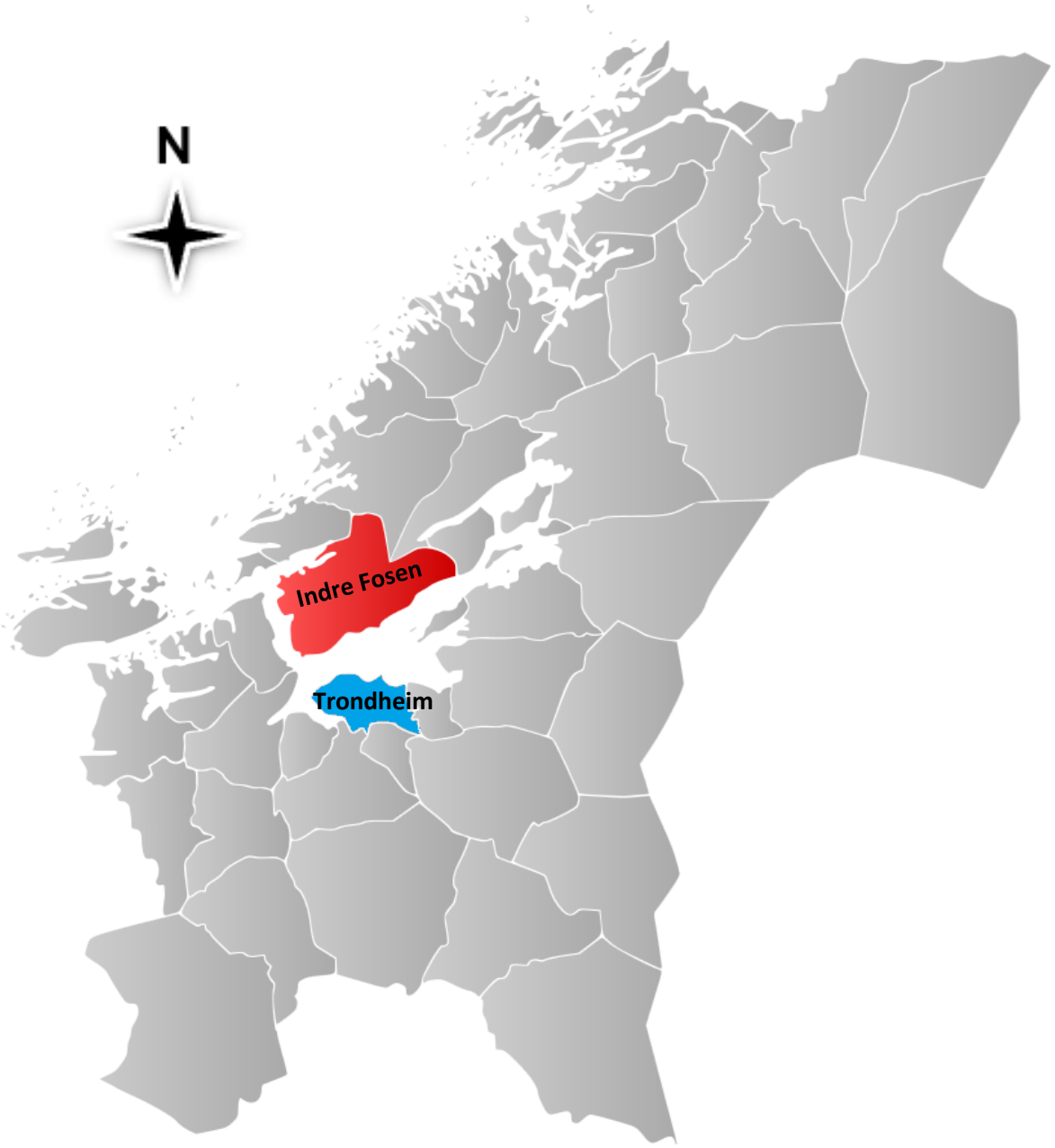

Figure 7: The location and size of the Indre Fosen and Trondheim municipalities in relation to the 46 other municipalities which make up the Trøndelag county, central Norway (Image source: Bjarkan, 2017).

Bondelag it is clear that these two communities have been affected recently by CC related hazards. Both Rissa and Byneset experienced, to varying extents, the impacts of the 2018 drought in Norway. In addition to the 2018 drought, it was learned through conversations that

these two communities are famous for their quick clay landslides. Byneset is especially famous locally for its quick clay landslides. 90% of all quick clay landslides in the Trondheim municipality occur on the western side of the Nidelva River, which is where Byneset is situated (Stømø, 2017). The area was badly affected in the early months of 2012 when large quick clay landslides engulfed farms and homes in the Byneset community. Figure 8 shows one such farm, which lost 50da of farmland to a quick clay landslide (Stømø, 2017, Pp 28). Whilst quick clay landslides are a man-made natural disaster, they are indirectly affected by climate change through increased erosion as a result of increased annual precipitation. An increase in annual precipitation has also recently affected a few members of these communities through flooding.

Figure 8: A large quick clay landslide which occurred in Byneset on the 1st of January 2012 and claimed 50da of farmland (Stømø, 2017, Pp 28).

3 Methodology

In this section the study design, applied methods, and methodological reflections are laid out. This is done by, firstly presenting the design and structure of the study, followed by outlining the applied methods, and finally a discussion on the reflections of the techniques used for this study.

3.1 Study approach

The following passage outlines the structure of this study and a description of the methods used to examine the level of community resilience in the selected case studies.

To examine the three dimensions of community resilience discussed in chapter 2 it was decided that a variety of qualitative methods should be used. Qualitative research allows this study to examine the traits of the communities as well as individuals within these communities. The ability to examine critical personal traits and values of the communities and individuals involved in this study is important given that research has shown that there is no clear correlation between a respondent's position and their personal beliefs. I.e. just because a farmer is being directly impacted by the effects of climate change, through increased intensity and frequency of flooding or droughts for example, it does not mean that he has to believe in the existence of climate change, he may still hold his own personal views on the matter (Taylor et al., 2014).

3.2 Case studies

Crang and Cook (2007) highlight the importance of conducting case studies when the purpose of the study is to carry out an assessment. Therefore, since this study is focusing on assessing and comparing the level of community resilience in rural communities of Nepal and Norway, the use of case studies is complementary to this thesis. Four case studies have been chosen for this thesis; two rural communities on the eastern rim of the Kathmandu valley in the district of Kavrepalanchok in Nepal and two rural communities in Sør-Trøndelag county in central Norway.

3.2.1 Nepalese case studies

Two case studies have been chosen in Nepal for this thesis. This decision was made after evaluating the restricted time available for this thesis and determining that the ability to carry out in-depth analysis would be damaged by attempting to conduct additional case studies in other regions of Nepal. After discussions with the Programme Coordinator of the Resilient Mountain Solutions Initiative at ICIMOD, Nand Kishor Agrawal, two communities in the Kavrepalanchok district of Nepal were chosen. The two communities which were chosen due to several factors. Primarily the selection process took in to account the similarities shared between the two communities in terms of elevation, climate, population size and hazards faced. Then the proximity of the communities to one another was taken into account. Considering the relatively close proximity of these two communities it was assumed that a greater number of higher quality in-depth interviews could be conducted by studying these two communities rather than by studying communities which were spread further geographically apart.

Due to the translation of place names from Nepali to English; the relatively small size of the communities assessed in this thesis; and their low economic significance to the national economy of Nepal, there are often many varying forms of spelling the names of these communities. These spelling variations can be seen in official government documents, surveys, and even on street signs in Nepal. Therefore, for the purposes of this study the spellings for the two case study communities shall follow the spellings used in the government's 2011 National Population and Housing Census for Kavrepalanchok (Central Bureau of Statistics, Government of Nepal. 2014). The first community to be assessed as part of the Nepalese section of this study is called Patalekhet and the second community is called Mathurapati Fulbari (which shall be shortened for ease to Fulbari henceforth).

3.2.2 Norwegian case studies

Similar to the Patalekhet and Fulbari communities in Nepal, certain rural communities across Norway may have to improve their levels of resilience towards hazards related to climate change. However, unlike Nepal, Norway is an already economically advanced and developed

country. Therefore, Norway was chosen for this study for two reasons. The first of these reasons was that communities in both Nepal and Norway are likely to face some similar impacts of climate change. Secondly, given the differences in economic and development statuses between the two countries it was of interest for this thesis to compare how social aspects of resilience building can contribute to improving the resilience of communities in both developed and developing countries. For this study the two chosen Norwegian communities will be in the Sør-Trøndelag county in central Norway.

The decision behind the selection of these two communities in particular came after discussions with the Organisational Head for the Sør-Trøndelag Bondelag, Jon Gisle Vikan. The Sør-Trøndelag Bondelag is a regional branch of the national Bondelag in Norway. The Bondelag is the largest organisation in Norway for farmers and for those with an interest in the Norwegian food production network. The Norwegian Bondelag's aim is to improve the working life, income, well-being and welfare of Norwegian farmers as well as landowner's rights and increased food production on Norwegian resources through the increased gathering and sharing of knowledge regarding diverse and innovative agricultural processes. Therefore, the Sør-Trøndelag regional branch has established itself as a key actor in the development process of rural communities across the Sør-Trøndelag county and was sought out for this study to help identify two potential communities for study in Norway. Following discussions with Jon Gisle Vikan, the two communities of Rissa and Byneset were decided upon after using similar criteria to that which was used during the selection process of the two communities in Nepal. The rural communities in both Rissa and Byneset face similar future environmental challenges related to climate change and located within close proximity of each other which allows this study to conduct more in-depth interviews.

3.3 Interviews

Interviews were used as the main method for data collection in this thesis as they provide a form of "qualitative research (which) is of specific relevance to the study of social relations" (Flick, 2014). Considering that this study aims to gather in-depth information from respondents regarding the communities which they live in, the preferred interviewing method was semi-

structured, face-to-face interviews. Taking a semi-structured, face-to-face interviewing method approach provided the interviewer with the best opportunity to ask and get answers from follow up questions which may have arisen depending on the response of the interviewee. The ability to ask follow up questions enabled the interviewer to steer the line of questioning towards relevant pieces of information which the respondent may have had on a particular topic. In an attempt to assist the gathering of in-depth information, where possible it was preferred to conduct the face-to-face interviews at the home of or in a particularly familiar location for the respondent. Choosing the respondents home as the location for the interviews assisted the data collection process in generating more insightful responses as, Crang & Cook highlight, the home provides both the interviewer and interviewee with a reference point as well as a visual reminder for the individual who may remember certain memories through the presence of objects which are close to hand (Crang & Cook, 2007). As will be seen later in the results and discussion sections, home interviews proved to be highly useful for this thesis as many respondents in Nepal, recalled memories of rebuilding their homes after the 2015 earthquake. This approach also provided the interviewer with the opportunity to visually witness and enquire about resilience building projects such as water storage ponds and biogas plants in the Nepalese communities which were found on the property of the respondent but were not brought up during the interviewing responses. When interviews located at the home of the respondents were not possible, the next best approach for this study was to attempt to conduct on-the-move interviews. On-the-move interviews have proven in past studies to stimulate the emotions and thoughts of the interviewee regarding their community which may have seemed disconnected or separate without the use of such a technique (Anderson, 2004). Lastly, when it was not possible to conduct the interviews needed for this thesis by means of face-to-face, the semi-structured interviews were conducted either through telephone or email. Email interviews were only used as a last resort for this study as they reduce the ability of the interviewer to ask follow up questions based off of the responses of the respondents. Furthermore, email interviews would be very difficult to conduct in the Nepalese communities given the language and technological challenges which would have had to have been overcome. No email interviews were conducted in Nepal, however, interviews via email were conducted in both of the communities in Norway after the expressed wishes of some of the respondents to answer only using this approach.

Due to the nature of conducting interviews in rural communities of Nepal and Norway with local community members, there were many challenges for the data collecting process of this thesis to overcome with the most prominent challenge being language. Whilst English is widely spoken across both Nepal and Norway for business and tourism purposes, it is not an official language in either country and is therefore not as commonly spoken or known in rural areas as it is in cities or tourist locations within these countries. In fact, given that communities living in rural areas are less likely to interact and therefore communicate with people who are not from their community the language spoken in these communities may even be a dialect of the official language, such as Trøndersk in the selected Norwegian communities. Therefore, given that I as a researcher and as an interviewer was not currently capable of conducting interviews at an appropriate level, in Nepali or Norwegian, to achieve the information that was desired for this study the use of a translator was needed for the case studies in both countries. It is vitally important to have a trustworthy translator present during interviews in which the interviewer has little to no understanding of the local language and the interviewee is not confident in the language of the interviewer. In such a case, the presence of a translator allows the interviewer to not miss any key pieces of information and allows the interviewee to feel more comfortable and confident in their responses, thus, providing better findings for the study. Furthermore, by ensuring that a trustworthy translator is employed during the interviews the interviewer can be confident in the impartiality of the translator whilst they are translating questions and responses, therefore, reducing the ability of outside beliefs and/or dogmas from having an influence on this study. Outside influences run the risk of disrupting a qualitative study and consequently provide less significant findings. For the purpose of ensuring impartiality, the two translators selected to assist this study were both well known to the interviewer and had previous experience in conducting interview translations. In Nepal a recent master's graduate from the Tribhuvan University, Kirtipur, with previous translation experience in rural parts of Nepal assisted with the translations for the two communities in Nepal. Whilst, a current master's student at the Norwegian University of Science and Technology, Trondheim, assisted with the translation of questions and responses to and from English and Norwegian.

Given that the majority of the face-to-face interviews were conducted either mostly or entirely in a language unknown to the researcher the interviews were not recorded. Instead, extensive notes

were taken during these interviews and were transcribed later that same day with the consultation of the translator. This decision was made due to the time and financial restrictions of this study which meant that recording and transcribing from the recordings with the aid of a translator after the interview would be too costly and time consuming for this study. However, were face-to-face interviews could be conducted in English the interviews would be recorded with a tape recorder, after receiving consent from the respondent, in order to allow the interviewer to focus more on the questions and responses during the interview and act as a reminder when transcribing later. Before the start of each of the face-to-face interviews the research participants were informed of the research topic, why the questions which would be asked and their responses were important, and how their responses would be stored and used for this study, and were then asked to confirm their consent in participating in this study. Furthermore, before each interview began each participant was informed of the intended length of the interview and were asked to agree upon a mutually beneficial time frame in which to conduct the interview with the interviewer. Life in rural communities is often busy and respondents would have to take time out of completing farm and/or other essential household tasks in order to participate in these interviews. Additionally, it is common culture in the selected Nepalese communities for hosts to welcome guests into their home, offer tea, and talk for as long as the guest wishes. In most cases it would even be deemed rude to ask a guest to leave in order to return to urgent tasks. Therefore, it is only polite and correct on the part of the interviewer to set a time for each interview which works with the interviewee's busy life but also provides enough time for all essential questions, including additional follow up questions which may arise, to be asked and answered.

In the cases specific to the data collection of the Norwegian communities were interviews were conducted via email the set of semi-structured interview questions were translated as closely as possible, with the aid of the Norwegian translator, from English into Norwegian. Certain questions needed to be rephrased or reworded when translated from English to Norwegian to allow for greater clarification given the differences that exist specifically in the Norwegian culture and language. These questions were then constructed in the form of an interview guide and sent to the respective respondents (shown in Appendix B). Before beginning each email interview, respondents were asked to confirm their consent to participate in this study by signing

and dating their response form. Once the responses had been returned to the researcher they were translated and transcribed into English with the aid of the selected Norwegian translator.

Additionally, permission from the research participants to take photographs (and use them in this study if needed) of them, their property, and/or their farms was sought after, when appropriate, to provide the researcher with material for recollection purposes during the writing of the study but also to aid the study through visual illustration.

Lastly, due to the relatively small nature of the number of participants interviewed for this study, a few semi-structured interviews with influential members of the communities, such as group leaders or social mobilisers, were seen as preferential to understand the motivations of the entire community.

3.4 Respondents

Purposive sampling was carried out for the research participants from all four of the selected communities. For the two communities in Nepal this was achieved with the support of ICIMOD and CEAPRED who in recent years have worked in close collaboration with the Patalekhet and Fulbari communities. Therefore, ICIMOD and CEAPRED were able to assist in identifying members in each community who were best suited to shed the most light on the key objectives of this study. Whilst in Norway purposive sampling was accomplished with the aid of the Sør-Trøndelag Bondelag. The Sør-Trøndelag Bondelag was able to reach out to key farmers and members of both the Rissa and Byneset communities. Purposive sampling proved to be an effective approach for the qualitative data collection needed for this study and made it possible for this study to target specific groups in all four communities. For example, it is a common occurrence in the Patalekhet and Fulbari communities for young men to leave the area for long periods of time in search of work either in other rural communities or in the cities. Therefore, by conducting purposive sampling this study was able to target young men between the ages of 18-35 who still live in these Nepalese communities in order to discuss any experiences or opinions they may have with regards to the community that they are a part of. Furthermore, a purposive

sampling technique enabled this study to attempt to carry out an even distribution between age and gender in the respondents interviewed in the communities. With that being said, purposive sampling was not the only method deployed in this study for selecting research participants. Snowball sampling was conducted in certain instances during field interviews in Nepal when research participants and community members referred us to other family members or members of the community who could be interviewed to gather further information about the community.

When explaining which research participants would be of interest to this study to both ICIMOD and CEAPRED in Nepal and the Sør-Trøndelag Bondelag in Norway a set criteria was discussed. The aim of the interviews in this study was to gather as much information about the community from as many different groups within the community as possible. Therefore, this study's goal was to receive 50% of its responses from men & 50% of its responses from women, as well as 50% of its responses from individuals aged between 18-35 and 50% aged over 35 years old in all four communities. Additionally, when conducting interviews in the Patalekhet and Fulbari communities of Nepal this study attempted to interview individuals from as large a mixture of castes and/or religious backgrounds as possible. It was decided that collecting a mixture of responses from different religious groups was not necessary in Rissa and Byneset as these communities do not have as diverse a make-up. Furthermore, whilst caste does not play as important a role in modern Nepali society as it previously has, its legacy still has implications for individuals today and thus was had to be represented and taken into account in this study. By dividing the respondents into these set groups before the purposive sampling took place this study was able to achieve an even spread of respondents from various age, gender, and ethnic groups in the selected communities. Through an even distribution of respondents this study could gain a more complete and well-rounded understanding of the true levels of community resilience which currently exist in the selected communities. Tables 7 and 8 show the number of research participants interviewed in each of the communities in both Nepal and Norway, respectively, as well as the number of individuals interviewed from various age, gender, and ethic categories. In total 24 interviews were conducted for this study, 16 in Nepal and 8 in Norway. As can be seen from tables 7 and 8 a higher number of interviews were conducted in the two Nepalese communities compared to the two Norwegian communities. One reason for this higher number

of respondents in the Nepalese communities was due to the fact that a lot of excitement was created by my presence in these communities during the home interviews. This excitement drew people from their homes and their work to come and find out more about this study and how they could share their own

Table 7: Information regarding the Research Participants from the two communities in Nepal.

Community	Respondents	Male	Female	Between 18-35 Years Old	Over 35 Years Old	Brahmin	Dalit	Tamang
Patalekhet	7	3	4	4	3	7	0	0
Fulbari	9	5	4	3	6	5	3	1

Table 8: Information regarding the Research Participants from the two communities in Norway.

Community	Respondents	Male	Female	Between 18-35 Years Old	Over 35 Years Old
Rissa	5	3	2	0	5
Byneset	3	0	3	1	2

experiences and opinions. Many of the community members in both Patalekhet and Fulbari seemed to be very interested as to why a student from a university in Norway was involved in studying the resilience of their community and therefore keen to help in any way that they could. Conversely, creating contacts with additional locals in the two Norwegian communities proved a challenge as small rural communities in Norway have a tendency to be more reserved and closed off to strangers and outsiders.

Information regarding each of the individual interviewees is provided in Appendix C and D for reference purposes.

3.5 Types of interviews

During this study three types of interview were applied; face-to-face, telephone, and email. After identifying the research participants through purposive sampling each interview approach was assessed and applied based off of which approach would prove the best at collecting the qualitative data needed for this study, given the varying restrictions that occurred. Whilst three types of interview were conducted, the most used interview was the face-to-face interview. Every interview conducted in Nepal was a face-to-face interview. In Norway a mixture of the three interview types were used.

3.6 Designing the interview questions

The purpose of interviewing these four communities has been to better understand the current level of resilience these communities have towards environmental hazards and which social aspects of their community may influence this resilience. Therefore, the questions asked during these interviews have been based off of literature studies on community resilience to climate change and specifically any known environmentally hazardous event which may have occurred in these communities recently. All of the questions asked, apart from the introductory questions which sought to gather certain background information such as age, name, occupation etc., were open ended. This was designed to allow the respondent more freedom in their responses which in turn often offered new and significant pieces of information. The questions were divided into the 4 main sections; introduction, community, local authority, and final questions. The questions in all 4 sections were designed not to be leading in any way. It is important that the questions asked were neutral and did not lead towards preconceived notions. See Appendix A and B for the interview guides used in both Nepal and Norway and a list of the questions asked during each interview.

3.7 Ethics

When conducting interviews as the main method of data collection for qualitative analysis it is crucially important that any potential ethnical issues which may exist are considered and addressed before conducting any interviews. Therefore, the questions which are likely to be

pursued during the interviews have to be evaluated before the interviews begin in order to avoid causing any harm or stress to the respondent. The groups which are most commonly at risk of harm during an interview and therefore have to be considered before conducting any interview are children, young persons, and women.

This study is interested in the social aspects of community resilience towards environmental hazards related to climate change and therefore does not require any responses from children or young persons. Thus, this study has removed this potential ethnical barrier by categorising respondents into two different age categories, 18-35 years old and above 35 years old. By doing this children and young persons were not contacted for this study and the questions did not have to be designed in a way to protect children and young persons. Whilst the experiences and opinions of children and young persons were not of interest to this study those of women were.

Women in these rural communities were a targeted group for this study as they make up a large proportion of these communities and provide large contributions to the development of these communities. Women in Nepal were especially important to interview as it is common practice for women in rural Nepalese societies to work very difficult and demanding agricultural jobs whilst also supporting and raising a family. Furthermore, given that many of the men in these rural Nepalese communities leave in search of work elsewhere, women are left to make decisions about the home community and therefore have recently found themselves in leadership positions. Thus, it is important for this study that an equal distribution of male and female respondents were interviewed. However, women, are often an at-risk group which could possibly present certain ethical barriers during the interview stage of this study. One potential barrier that this study had to consider is that “many women understandably are often reluctant to invite unknown men into their homes which can pose problems for male interviewers conducting research” (Herod, 1993: 309). Since both the interviewer and translator for this study were male and this study involves face-to-face household interviews which aimed to achieve 50% female respondents, gender issues provided a genuine ethical barrier to overcome. This issue was considered and measures such as having either a familiar female representative from CEAPRED or the community guide us around, introduce us to the respondents, and be present during the

interviews themselves within the households were taken. By conducting the interviews in this way, it seemed to have provided the female respondents with reassurances as the issue of gender differences was never raised by any of the interviewees. Furthermore, all of the female respondents appeared confident whilst discussing and giving information regarding their personal experiences and opinions on their communities' levels of resilience to environmental hazards related to climate change in their area. However, as previously stated, if the respondent was willing to take part in the interviewing process but did comfortable having a male interviewer in their home, even with the presence of a familiar female CEAPRED or community representative, it was necessary to adapt the interview method and adopt an 'on-the-move' approach around the community.

Additionally, the topic of this study is "community resilience" which is not imagined to be a particularly controversial issue. Therefore, the line of questioning is likely to not be harmful to the research participants and it is hard to conceive of any additional ethical issues, other than those previously mentioned, which must be taken into consideration. Lastly, before the start of each interview a time frame for the interview was agreed upon by both the interviewer and research participant as well as a presentation from the interviewer explaining the study and its objectives. At this time verbal consent was given by all research participants to use their names and information for the purpose of this and potentially additional studies.

Whilst permission was received from all the research participants involved in this studied as a precautionary measure the participants who cannot be easily identified from their responses have had their names replaced with monikers. This step was taken in order to protect the research participants from potential consequences that they may not have been able to foresee from the outset.

3.8 Coding of interviews

As Crang and Cook mention the first stage of qualitative data analysis is all "about chopping up, ordering, contextualising and assembling the data we have so diligently constructed. It's about translating a messy process into a neat product" (Crang & Cook 2007: 133). All of the 24 interviews have been transcribed into an easily readable format in order to improve the coding process. Once this process was completed the transcripts were analysed to discover relevant and reoccurring pieces of information, words, phrases, and/or themes. Highlighted pieces of information, themes, key words and phrases were labelled to allow for further analysis of the data through coding. Codes were therefore created to address information which was explicitly stressed by the research participant as important, information which surprised the researcher, and information which had been repeated by several different people and/or in several different locations. By coding the data collected through a mixture of interviewing approaches in this format enabled this study to conceptualise the underlying pattern of opinions and experiences amongst the case communities. This conceptualisation through the coding of the transcripts allowed for an analysis of the strengths and limitations of the social aspects the communities' resilience to be carried out in this study.

3.9 Methodological reflections

In this section, the choices made in this thesis concerning the methods, research participants, and performance are reflected upon.

Firstly, it was my choice as the researcher for this thesis to examine the strengths and limitations of communities in Nepal and Norway. Seeing, as I am not a citizen of either of these countries, this decision presented many advantages and disadvantages from the offset. As mentioned previously, not being a native speaker of the languages spoken in the studied communities presented many linguistically and communicational challenges which had to be overcome during the interviewing process. Additionally, there may have been certain cultural definitions that I may have missed as a visiting researcher, with limited prior knowledge of the communities. Whilst, I had the assistance of translators and carried out research background research on the

communities before each interview, it is still possible that a native and national citizen would have been better equipped to conduct the interviews for this study. However, the main advantage that I saw for studying communities in two countries that I am not a national citizen of was my ability to provide a prospect of an outsider looking in. As I am not from either of the studied communities or countries, I came into this study with an open mindset. This allowed me, I hope, to present a fair and balanced comparison between the communities without any prior preconceptions or prejudices.

Secondly, a fundamental choice of this thesis was to focus on three dimensions of community resilience. By deciding to only focus on three dimensions of community resilience, this study was able to provide an in-depth analysis of the selected communities. However, the results of this thesis may have varied if different dimensions had been chosen. Lastly, with regards to the research participants it would have been beneficial for this thesis if a larger number of people, especially young people, from Rissa and Byneset could have been interviewed. It would have been interesting to obtain a clearer view of how the future generation perceived climate change and its impacts on their community. If a similar study were to be conducted greater contact with and presence in the Rissa and Byneset communities may provide an approach to include more younger people.

4 Findings

The analysis conducted in chapter 5 is based around the modified combinational model of community resilience shown in figure 3. The three main dimensions of community resilience studied in this thesis; social capital, information & communication, and community capacity are used as the framework for the analysis. The interviews carried out with local community members from Fulbari, Patalekhet, Rissa, & Byneset, provide the empirical basis for this thesis and is presented in this chapter.

The strengths and limitations identified in each of the case communities regarding their community resilience towards hazards related to climate change are derived from the participants' own evaluations of their correlating community. Thus, the subsequent sentiments shown throughout the analysis may not necessarily align with the observations and understandings that I, as a researcher, may have perceived from studying these communities. However, any interpretable differences between the local community members and the researcher will be highlighted and discussed to gain a better understanding on approaches to enhance the strengths and minimise the limitations in the communities' future levels of community resilience.

4.1 Social capital

4.1.1 Attachment to place

It is important to study the attachment to place which individuals have in order to understand why so many people, who despite understanding the risks, continue or return to live in an area that is vulnerable to hazards related to climate change. During the interviewing process, research participants from the four case communities revealed feelings of connection and attachment to place. Responses to questions such as: "how long have you lived in this community?"; "have you, or anyone you know, ever moved or considered moving away from your community due to the risks associated with climate change on their area?" proved very insightful.

Research participants from the Norwegian communities of Rissa and Byneset responded that their sense of attachment to place was stronger than the pressure, associated with future climatic hazards, to leave their community. Almost all respondents from both communities stated that they had never considered the risks associated with future climate change as a reason to leave their respective community. Only Eirin, a 46-year-old farmer from Byneset, replied that she had considered leaving her community in the future due to impacts of climate change.

> I am worried about the quality of our topsoil. The modern commercial agricultural techniques have contributed to a lot of soil erosion. If the erosion continues or intensifies in the future, because of increased precipitation, I doubt my farm will be able to produce enough to support my family and me.
>
> (Eirin, from Byneset)

All of the other respondents from Rissa and Byneset stated that even though they were aware of the risks that their community faced as a result of climate change, they felt that they would learn to live with the new challenges as they always have in the past. Unless as Lena, a 30-year-old female wildlife preserver and farmer from Byneset, says, “there is suddenly a new ice age in which us farmers are forced to move south in order to produce, we will continue to live here”. The sentiments shown by Lena and other local community members in both Rissa and Byneset highlight the strong attachment to place that the respondents feel towards their communities. Many of the respondents stated that part of this attachment to place stems from their and their family’s history within the community. Most of the respondents from the Rissa and Byneset communities had lived in their respective community their entire life, except for short durations away as part of their Norwegian military service. A few respondents, such as Simon a 50-year-old goose and dairy farmer from Rissa, stated that they had lived away from their community for a couple of years in order to study and work in Norway’s cities. However, these respondents also stated that they had decided to return to their home community when their parents became unable to look after the family farm on their own. Only one respondent, Frida a 44-year-old female dairy and fodder farmer from Rissa, replied saying that she was not originally from the

one of the case communities. Instead, Frida stated that whilst working in on of Norway's cities she met her husband and decided to move to Rissa to start a family on his family farm. Frida stated that her and her husband decided that Rissa would be a cleaner, safer, and friendly place for their children to grow up in than say a city in Norway. Other respondents from both Rissa and Byneset made many comments similar to that of Frida. These respondents also believe that the natural environment and friendly community makes them feel a stronger attachment to their communities.

However, whilst most of the research participants from Rissa and Byneset stated that they never considered leaving their communities due to the future risks of climate change, some of the respondents commented that the younger generations might not feel the same way. Hans, who left the Rissa community at a young age before returning 20 years ago, is worried that his community may fade away if the young people do not choose to stay. He suggested that young people might perceive the future hazardous conditions to be too challenging to continue living in the community.

> I believe that there is a problem in Norway with the younger generations moving away from their family farms as I did. The kind of work that you have to do is very tough and manually intensive. If this work becomes more challenging because of changes in the climate, I worry that young folks will not come back.
>
> (Hans, from Rissa)

Hans stated that, like many young people now, he left Rissa to go to university but instead of returning after graduation, he spent his next 20 years living and working in Norway's capital city, Oslo. Hans said that he eventually grew bored of the city life and returned home to help his father take care of their family farm. Hans said that he returned home as he wanted to make sure that his father had a comfortable life but also to keep the family farm, which has been in their family for over more than 300 years, in their name. Many respondents from Rissa and Byneset mentioned how this sense of pride, in keeping their farm in their family, was one of their main attachments to their communities. However, whilst Hans is worried

that his community may fade away due to the out-migration of the youth, there are others in Rissa and Byneset who replied stating that they believed that their children would one-day return to the community. They believe that when they themselves become too old to manage their own family farm their children will return to keep the land in their name, just as Hans did.

Similar to the responses from the Norwegian communities, the majority of the respondents from Fulbari and Patalekhet stated that they had lived in their respective communities their entire lives and that their family had lived there for generations. One of the only respondents who stated that he had not lived his entire life in the respective community was Maheshwor, a 31-year-old farmer from Fulbari. Maheshwor stated that he had grown up in Fulbari but his family had urged him to travel to the Saudi Arabia to work and send home financial remittances. Maheshwor stated that he had worked as a construction worker in Saudi Arabia for several years. However, after the 2015 Gorkha earthquake destroyed his family home he decided to return to Fulbari to help his parents rebuild their home and generally assist with farming. Maheshwor decided to stay in Fulbari after rebuilding his family home because he got married and had a desire to be close to his family. Many respondents from Fulbari and Patalekhet stated that family was one of their strongest attachments to their community. Several research participants from both communities also mentioned that part of their attachment to place came from the natural beauty of their environmental surroundings. Nirmala, a farmer from Patalekhet, expressed this sentiment by saying: “if it were not for the water shortages, this would be the best place in the world to live”.

Most of the respondents stated that, because of their family history in their community and the beauty of the place, they would be reluctant to sell their property and/or leave the community. However, unlike the responses from the two Norwegian communities, many in the Fulbari and Patalekhet stated that they either knew someone who had left or that they themselves had considered leaving the community due to the associated impacts of climate change. In the same way that it is common for young people to move away from the Rissa and Byneset communities, young people, and in particular young men, often move away from Fulbari and Patalekhet leaving the older generations behind. However, rather than a personal choice by young people,

this outward migration of the youth from Fulbari and Patalekhet is often the result of families trying to increase their resilience. In Fulbari and Patalekhet families with multiple children often encourage one or more of their children to leave the community in search of work, thus diversifying the family income through financial remittances, as seen in the example of Maheshwor mentioned earlier. As shown in table 4, section 2.2.2, the average population growth rate for the Kavrepalanchok district has in recent years been negative, meaning that more people are leaving the district than are entering it. This combined with the statistics from table 5 showing that there are about 7% and 4% more women than men in Fulbari and Patalekhet, respectively, highlights the suggestion that young men are being encouraged to leave these communities in search of work. However, many respondents from Patalekhet and Fulbari stated that they had considered leaving their community for climatic reasons as well as financial ones. They stated that the recent challenges which they have faced as a result of climate change has made them consider leaving their communities for somewhere with less risk.

Fulmaya, a 63-year-old farmer and social mobiliser from Fulbari, stated that from her family only she and her husband have remained in the Fulbari community. Fulmaya said that her six sons had all decided to leave the community because of the droughts that the area has experienced recently as a result of climate change. Fulmaya stated that she could have left as well but that she never considered doing so because she did not want to sell or abandon the home that had been in her family for generations. She continued by saying that now she is "too old to move even if the drought problem worsens" and so will remain in the community regardless of the future risks. Many older respondents from Fulbari and Patalekhet stated that they could not leave their communities due to their age and/or physical health conditions. However, the majority of the respondents from the younger target category, between 18-35 years old, stated that they have plans to leave their community. Ramesh, a 25-year old farmer from Patalekhet, said that he would move to Kathmandu in the future in search of a better quality of life. He stated that a lack of water and cold night temperatures had seriously reduced his vegetable output. Ramesh said during an interview that in 2017 he had earned 70,000 Nepali Rupees (~US$619) from vegetable sales but as of 20/11/2018 he had only earned 7,000 Nepali Rupees (~US$62).

> If I work for 6 months on my farm I won't earn enough to support my family for 3 months.
>
> (Ramesh, from Patalekhet)

Therefore, Ramesh said that he and my of his friends are hoping to move to Kathmandu where they perceive that they will have access to better paid jobs, which will offer them better health and educational services for them and their families. However, like in the Norwegian communities, some of the respondents from Fulbari and Patalekhet stated that their sense of attachment to the place as a result of family bonds would mean that they stay even if the climatic conditions worsen. Some respondents such as Cheta, a 46-year-old tailor and farmer from Fulbari, stated that they sometimes consider leaving the community but never will, as they want to look after their older relatives.

> Sometimes I feel that if I was able to get land or a job outside of Fulbari that I would leave the community. However, I have to stay to look after my elderly mother who because of her old age is unable to look after herself.
>
> (Cheta, from Fulbari)

Despite the challenges that climate change pose on all four communities studied there are still many whom, often for personal reasons, feel a strong sense of attachment to their community. This strong sense of attachment to place is important in terms of building community resilience as it provides a determination in the communities to govern and protect their own place.

Summary of Strengths and Limitations:

Table 9: A summary of the strengths and limitations gained from the responses regarding attachment to place.

Community	Key Findings
Fulbari & Patalekhet	• People feel a sense of attachment to their community.

	• Many feel the pressures to leave are growing stronger than the sense of attachment to stay. • Most feel a sense of pride in the beauty and safety of their community. • Some people feel pessimistic about the future of the community concerning the outmigration of youth.
Rissa & Byneset	• People feel a sense of attachment to their community. • Most feel a sense of attachment that is stronger than pressures to leave. • Most feel a sense of pride in the beauty and safety of their community. • Most have faith that their children will return to their community. • Most feel optimistic about the future of their community concerning the outmigration of youth.

Data Interpretation Considerations:

It is important to note that the majority of the respondents from the two Norwegian communities are older than the targeted youth category (18-35 years old) established during the methodology of this thesis. Therefore, the perceptions given by many of the respondents that the younger generations will eventually return to take over the family farm may not be representative of what the current younger generation actually thinks. Further interviews with respondents from this younger generation would provide a better understanding of their views on attachment to place.

4.1.2 The ability to live with risk

Living with or through any risk or hazard can seriously affect the mental and physical welfare of an individual, and the risks and hazards related to climate change in the four studied communities of this thesis are no different. The tough weather conditions during the different seasons can present major mental and physical stressors for the two Norwegian communities. Through conducting the data collection necessary for this thesis in the early months of the year, it was evident from fieldtrips that to survive the winter weather in these Norwegian communities requires a lot of mental strength. The conditions in these communities during the winter period are often very cold and very dark, which can often make these communities feel deserted. The

respondents that live in Rissa and Byneset stated that although these conditions are tough, they have learned to cope with them. Many participants responded saying that during these cold and dark periods they often spend time with friends and family and make their homes "koselig" (a Norwegian word which translates to a feeling of cosiness, which may be achieved through open fires in the home, such as fireplaces and/or candles, blankets, coffee, and home-made waffles). This community togetherness and feeling of koselig was indirectly mentioned as an important factor in dealing with the mental stresses that the winter periods in Norway bring. Whilst none of the respondents in the Norwegian communities stated that they were ever mentally affected by the impacts of climate change there were those who stated that they had been emotionally and physically affected as a result. Idunn, a 54-year-old female property and contingency manager, and farmer from Rissa, stated that she had, for a short time, been emotionally affected by spring flooding on her farm. She stated that she was deeply upset for a period when flooding had washed away all of her crops. Additionally, Frida, from Rissa, also stated that she had been emotionally affected after the drought in the summer of 2018 forced her and her family to send many of her dairy cows to slaughter, as the dry conditions meant that they were unable to provide food for the cows to eat. Lastly, Sigurd, a 47-year-old male organic and conventional grain and dairy farmer from Rissa, said during an interview that the constant spring floods had added extra physical stress into his life. He has to manually work to clear the water away from his agricultural land. However, whilst a few respondents stated that the tough weather conditions experienced in their communities has in same way influenced either their physical or mental health, none of the respondents from Rissa or Byneset stated that they had experienced lasting physical or mental damages as a result of the tough climatic conditions. Instead, many of the respondents stated any negative mental effects caused by tough climatic conditions are only short lived due to the support of their community. The respondents stated that their sense of community (discussed further in section 4.1.3) helps prevent long-term impacts. Oda, from Byneset, stated that there is a feeling of support in the community when then is extreme weather. Oda said that just knowing that you are not alone and that the rest of the community are in "the same boat" as you helps to make discussing your problems with others easier. In attention, many of the respondents from the two communities stated that in addition to the social support that the community is able to provide, farmers also receive subsidies from the government for living in

tougher climatic areas (discussed further in section 4.1.4) and have insurance (discussed further in section 4.1.5) which many said makes they feel more prepared.

However, a number of respondents from Fulbari and Patalekhet did stated that they had experienced lasting mental and/or physical damages because of previous hazardous events in their communities. Whilst the 2015 earthquake is not related to climatic changes, it still provides a viable insight for this study into whether these communities are able to live with extreme risks.

Many of the respondents from Fulbari and Patalekhet stated that they felt high levels of mental stress during and after the 2015 earthquake. Cheta, a 46-year-old farmer from Fulbari said that he felt "very hollow inside" for a few months after the earthquake and that he had "a kind of sadness from within that stops you from wanting to do anything". He and others stated that they felt lasting mental trauma in the weeks and months after the earthquake. Many respondents stated that they would occasionally wake up in a panic and run outside because they thought that they were experiencing another earthquake when there was none. The majority of the respondents who mentioned that they experienced lasting mental trauma said that this came from seeing their homes being damaged or destroyed during the earthquake. Many of these respondents from Fulbari and Patalekhet whose were not destroyed stated that during the weeks immediately after the earthquake they were too afraid to stay in their homes and opted to sleep in tents outside. However, whilst many of the respondents stated that they had felt mental stress during and after the 2015 earthquake, they also mentioned that their local community helped to mitigate and reduce these stresses through mutual support.

For example, both Nirmala and Home-Kumari, female farmers from Patalekhet, stated that after the earthquake many members of the community came together to sleep, eat and live amongst one another for several weeks after the earthquake. They mentioned that even community members whose homes were not destroyed still decided to sleep in tents near to other members from the community. Nirmala and Home-Kumari said that people from the community hosted others in their gardens and allowed them to sleep in tents close to their own to help overcome the

mental trauma which ensued as a result of the earthquake. Nirmala said that people felt less afraid when they were sleeping in tents near to their neighbours or other community members.

Additionally, Sudarshan shared similar stories to the ones told by Nirmala and Home-Kumari about how his Fulbari community responded after the 2015 earthquake. Sudarshan said that in the days after the earthquake many of his neighbours came over to live together on his land and support each other. He mentioned that some of his neighbours helped other community members by cutting bamboo to make the structures of a tent and setting them up on his land so that more community members could sleep together. He highlighted that this supportive process helped to bring many members together and formed new relationships, which did not exist before the disaster.

Summary of Strengths and Limitations:

Table 10: A summary of the strengths and limitations gained from the responses regarding ability to live with risk.

Community	Key Findings
Fulbari & Patalekhet	• Evidence of community unity to support each other after a large hazardous event.
Rissa & Byneset	• No long term mental or physical effects because of climatic conditions. • Culture (koselig) and sense of community provide some social support. • Government and insurers provide some reassurances.

4.1.3 Sense of community

Social capital is measured by "the levels of trust, cooperation and reciprocity in a social group" and plays the most important role in determining the actual resilience of a community towards hazards related to climate change (UNDP, 2004). Trust, cooperation, and reciprocity are the key

factors in the sense of community that a community has. This sense of community enables a greater level of community responsiveness, which in turn minimises the risks associated with climate related hazards for communities. However, community connections can erode over long periods or extreme instances of social stress. In the previous two segments, sections 4.1.1 & 4.1.2, examples of this sense of community have been given passively and indirectly. This section of the thesis shall focus directly on what aspects of each of the communities has strengthened or eroded this sense of community.

From the responses of the research participants in the Fulbari community of Nepal it seems that the intensified and increased periods of drought, resulting from climatic changes, has applied pressure on the local community members and has steadily eroded the community's sense of community. The majority of the respondents from this community stated that they no longer had very good contact or relations with others in their wider community. Instead, it appears that the sense of community has retreated from the feeling of a closely bound and cooperative whole community to smaller and more separate social groups made up mostly of immediate family members and/or long-term friendships. Kamala, a 35-year-old farmer from Fulbari, gave an example of this retreat into smaller, tighter knit social groups during her interview. Kamala stated that she had "no relationship with individuals or groups in the community outside of my family. I use the community cooperative for financial support sometimes but mostly I rely on my family more than the community in times of need". Kamala went on to say that she had a large and supportive family who could always assist her in disaster preparedness or recovery if she needed it. She continued discussing how her family was willing to provide her with support by giving an example from her son. Kamala said that her only son decided on his own to leave the Fulbari community for a job as a professional painter in Kathmandu. He did this, she said, as he felt that it was his obligation to work and send most of his money home to help pay the family debt. Kamala said that her sons' actions had been very beneficial to her and had relieved some of the financial stress that her and her husband were under. In Fulbari these smaller social groups seem to represent a great strength in terms of the resilience of individuals in the community. However, the increased reduction in the sense of community in Fulbari presents a great challenge for individuals with less social capital and fewer smaller social groups.

For example, Cheta, a 46-year-old tailor and farmer from Fulbari, told this study that he has experienced exclusion in the community because of his caste. He stated that he had often not been invited into community lead groups or been able to make the same connections and relationships within the community as others because he was a Dalit. He stated that he had a smaller social group than others in the community, which was almost exclusively comprised of his immediate family. Cheta told us that his son had left Fulbari to move to Malaysia and since then he has had no contact from him. Therefore, Cheta mentioned that he felt a low sense of community with both his community members and his father. Members of the Fulbari community who can neither rely on their family or the togetherness of the community as a whole to prepare for the future hazards related to climate change expressed a feeling of hopelessness towards the future throughout the interviewing process. In order to begin to address the issues related to a reduced sense of community we must first understand what the driving factors behind the erosion of the sense of community are in Fulbari.

As an elder and social mobiliser, Fulmaya proved to be a valuable source of information in understanding the causes of the reduced sense of community in Fulbari. In these rural Nepalese communities, there is often a custom known locally as the "parma system" whereby agricultural workers from neighbouring farms, and from the wider community in general, work cooperatively on one members farm during the harvest season and expect no payment in return for their labour. Instead, the assisting farmers help their neighbour collect his or her harvest because they know that in the future their neighbour will come and help them collect their own harvest. This local custom has for a long time been used by rural communities in Nepal to save money on labour costs and increase the overall sense of community within their communities. However, Fulmaya tells this study that whilst the parma system still exists in Fulbari the reduced crop yields, as a result of climate change causing increased occurrences and intensities of droughts, have meant that less time and effort is put into the collection of the harvests. Therefore, since the farmers and community members spend less time helping one another the parma system no longer builds the same sense of community as it once did in the Fulbari community. Fulmaya went on to say that the results of reduced crop yields have led more people in the community to become poorer. The decrease in individual wealth has applied extra stress to the community's sense of community

she said. The fact that an increased proportion of the community is poorer because of climatic changes has led to fewer people seeking financial assistance from other members in the community. There are fewer people in the community who can now afford to assist others financially. Furthermore, those who can afford to assist their neighbours often feel that if they loan out their money to poorer members of the community then they will never get it back. The out migration of young people from the Fulbari community has also had an effect on the sense of community. This has been given as a reason for why many have retreated to their own smaller social circles within the community as they know these people are less likely to leave in the future. In addition, Fulmaya also stated that certain migrant sending households in the community have experienced disproportionate financial gains due to economic remittances compared to non-migrant sending households. She stated that this economic inequality during the droughts related to climate change has created a "have" and "have nots" society in the local community which has "damaged the feeling of community togetherness". Fulmaya spoke also of the historical sense of community in Fulbari. She said how in the Nepali year of 2056 (1999 A.D.) she was an active member of an informal Fulbari women's group which was able to come together and collectively pressure the local government organisations into providing assistance to the community with regards to droughts. She spoke proudly of the success this women's group had in achieving specialised water management and harvesting techniques as well as the establishment of several water tanks for the Fulbari community. However, she went on to say that there was no longer such a women's group in the community. She attributes this to a lack of initiative from the women in the community who now are increasingly more reliant on men to solve their problems. Lastly, another reason which was given by several respondents for the growing disconnections within the Fulbari community was the recent changes in the way that the development projects in the community were handled. In the past, respondents stated that they would come together with others from the community in informal groups and rally around a certain common issue to find a solution. Today the community has constructed a formal Village Development Committee, which is responsible for the development projects within the community. One respondent, Sudarshan a 53-year-old Brahmin farmer, stated that:

> Now the VDC have established themselves in the community, we don't have to go and be a part of the development projects, the (VDC) office will decide and handle everything.
>
> (Sudarshan, from Fulbari)

This detachment from responsibility has, according to some respondents from Fulbari, hampered the relationship and feeling of togetherness within the community.

Patalekhet appeared to have a considerably stronger sense of community. Many of the respondents from the Patalekhet community replied that they had very good contact with their neighbours and with the greater community as a whole. Most respondents stated that, in addition to holding conversations with other members of the community outside of their smaller social group, they often participated in community gatherings where local issues were discussed. When asked where this sense of community stemmed from many of the respondents replied stating that collectively working together to complete particularly labour-intensive tasks, like collecting water and/or harvesting, build a strong bond within the community. In addition, it was noted that the better climatic conditions in Patalekhet led to larger harvests than compared to Fulbari, and therefore the parma system was conducted more regularly in Patalekhet. Lastly, the existence of many active groups within the community, such as the formal women's group which was established with the help of CEAPRED, also provided purpose for individuals to work collectively to help build the community resilience as well as provide a regular assembly point to strength the sense of community within the Patalekhet community.

Even though differences were noticed between the Fulbari and Patalekhet communities regarding the sense of community they felt towards their whole community, it was discovered that for both communities there was a strong sense of community when it came to large community-based events. Celebratory events such as puja's, weddings, and child births as well as times of grief such as deaths in the community and funerals brought community members together in both communities. Respondents from both communities replied that even if they did not talk to the other members of the community on a daily basis or if they had lost contact with them over

recent years, they would still be invited to these large events in which everyone in the community attends. Respondents from both communities stated that these large events help to maintain the sense of community as it provides an occasion for people to communicate and experience shared events. These events were often stated by respondents as their largest source of sense of community towards their whole community.

Similar to the Patalekhet community in Nepal, both of the communities in Norway responded saying that they have a very strong sense of community in their respective community. This sense of community was often very strongly described by the research participants. For example, Lena, from Byneset, when asked what community meant to her replied:

> It takes a village to raise a child
>
> (Lena, from Byneset)

Lena was quoting a famous African proverb which describes how it takes the efforts of an entire community of people interacting with a child for that child to experience and grow up in a safe and healthy environment. Another quote from Frida, a 44-year-old female farmer from Byneset, provides a similarly strong sense of community, but with a slightly different definition, when she says that a community is:

> An ally with common affiliations.
>
> (Frida, from Rissa)

These two quotes provide a brief overview of the multiple strong definitions of community given by the members of the Byneset and Rissa communities. For many of the respondents from Rissa and Byneset their local community is their identity. Several of the respondents said that their families had been living in these communities for hundreds of years and that their roots belonged to their respective community. Many of the respondents replied stating that for them their community was more than just their close friends and family but was rather the entire

community ranging from immediate family to nearby neighbours to unknown members of the community. This sense of community, in both the Byneset and Rissa communities, was said by some of the research participants to have come from the shared cultural values and experiences which exist in these small communities. When describing how these shared values and experiences build a strong sense of community within her rural community, Lena made another very powerful statement.

> Byneset is part of the municipality of Trondheim, but we probably see ourselves as a separate small ecosystem in this city municipality.
>
> (Lena, from Byneset)

Lastly, all of the research participants from both Rissa and Byneset said that they were members of the regional branch of Bondelaget, however, they stated that this membership only slightly positively affected their sense of community towards their relative community. Instead, local institutes and activities such as voluntary organisations, schools, workplaces, and sports clubs presented local community members with opportunities to meet, discuss one and others life's, and take part in common activities which further strengthened their sense of community.

Summary of Strengths and Limitations:

Table 11: A summary of the strengths and limitations gained from the responses regarding sense of community.

Community	Key Findings
Fulbari	• Sense of community diminishing. • Climatic changes have negatively affected traditional community customs, i.e. effectiveness of the parma system has been reduced. • Diminishing household incomes and household income inequalities (between migrant and non-migrant sending homes) highlighted as a driver of erosion in the local sense of community. • Lack of initiative to form local groups.

	• Establishment and processes of the VDC has potentially led to a reduction in community involvement. • Large events help to maintain the sense of community.
Patalekhet	• Strong sense of community. • Participation in community gatherings. • Better harvests lead to more interactions with neighbours and a more effective parma system. • High level of community involvement through local community groups. • Large events help to maintain the sense of community.
Rissa & Byneset	• Strong sense of community. • Shared cultural values contributes towards sense of community. • Local institutions and activities present opportunities to meet and work together.

4.1.4 Perceived and received support

Perceived support in this sense denotes the support which the locals of Fulbari, Patalekhet, Rissa, and Byneset assume they will receive before, during, and after a climate related hazardous event, whilst the received support refers to the support that they actually get.

In both of the Norwegian communities of Rissa and Byneset there was a common agreeance amongst the research participants that anyone who needed help would receive it. In both communities, respondents stated that all that was needed to obtain assistance was for the individual to reach out to others in the community and ask for it. For small pieces of everyday type assistance, such as the borrowing of agricultural equipment for a short time or asking someone to look after your livestock whilst you are away from the community, it was emphasised by the respondents that neighbours as well as other community members would be more than happy to help. The research participants from Norway said that when someone was in need of larger financial assistance the government and other bodies, such as the national

development bank, Innovasjon Norge, would more than often be able to help. Hans from Rissa provided a personal example of such financial support when he was in need of financial assistance to start his business. Hans owns his own company called Reins Kloster, which specialises in producing organic products such as ice cream, beer, and aquavit (a traditional Norwegian alcoholic spirit). However, he said that at the moment his company is not a financial success. “I lose money making beer and ice-cream, but I find the idea of producing local organic products so inspiring that I continue anyway. I hope that my products will encourage other farmers to produce organically and that consumers will choose to purchase more local organic products”. Hans stated that if it were not for Innovasjon Norge his business would have struggled to start and the company would be in an even worse situation. He stated that in the start “Innovasjon Norge provided me with the funding necessary to develop my company”. In the initial phases he used the funding from Innovasjon Norge to purchase his own ice cream making equipment (see Appendix F). He went on to state that Innovasjon Norge are a very reliable and generous source of financial assistance to farmers in Norway.

> When you are a farmer in Norway you can have access to quite a bit of money from Innovasjon Norge. There is special support for us farmers which makes it easier for us to receive support than others in Norway.
>
> (Hans, from Rissa)

He continued to discuss the benefits that Innovasjon Norge provide to Norwegian farmers like him and described how the funding from them worked.

> With Innovasjon Norge, if you have a project which gets accepted for funding and the project costs say 200,000 Norwegian Kroner, Innovasjon Norge will provide you with around 100,000 Norwegian Kroner or around 50% of the total cost. This is to ensure that you (the receiver of the funding) are motivated and dedicated enough to see the project through. Innovasjon Norge do not want to waste their money, because you (the receiver of the funding) do not have to pay back the 100,000 Norwegian Kroner to them, once they approve the project that money is yours, it is not a loan.
>
> (Hans, from Rissa)

Therefore, whilst there are financial development institutions available to farmers in Norway who offer to provide support, the level of support is not 100% and it is up to the farmers themselves to raise a large proportion of the money needed for new projects on their own.

In addition to receiving financial support for new development projects, farmers in the two Norwegian communities highlighted that there is also financial support available for those living in areas which are particularly negatively affected by climate conditions. An example of this support which many of the respondents from the two communities gave was the financial subsidies that the government award to farmers who live and produce products in more challenging climatic areas of Norway. Sigurd, from Rissa, clarified this point when he said that: "the tougher conditions that you have weather wise, the more money that the government will give you in compensation to farm there". A few respondents concluded that whilst it was the government that actually provided the farmers with these financial subsidies, the main political support and backing came from the Senterripartiet and the national Bondelag. These two, farmer focused, national organisations provide very powerful voices for Norwegian farming communities in Norway's political system, ensuring that the needs of the rural communities in Norway are always heard at a national level. Farmers in Norway stated that they believed that in one way or another they received support at both a national and local level. Simon, a 50-year-old male farmer from Rissa, provided an example of how the local municipality are providing support to his local community.

> Last summer (2018) there was a survey carried out by the local municipality regarding who had too little crops and who had a surplus. The people with a deficit received financial and informational support from the local municipality to help improve their farms.
>
> (Simon, from Rissa)

Almost all of the respondents from the two Norwegian communities also spoke of either receiving or knowing someone who had received financial support from the government to help cover the costs of damages caused by hazardous events related to climate change, such as

flooding or droughts (the dry summer of 2018 was a particular focus point). The research participants stated that they received financial support from insurers and the government after their land had been surveyed and the costs estimated. Many replied that they believed that the full costs of the damages were not covered by the insurers or the government but were happy to receive a large amount of financial support, without which they said they would have had serious economic concerns.

Lastly, Lena, a 30-year-old female farmer from Byneset stated that it was not only financial support that she expected the local and national actors to provide but also infrastructural preparedness and responsiveness. When asked if she was aware of any work that had been carried out by local authorities (such as by the municipality) or local actors/organisations (such as the Bondelag) to help build resilience in her community towards future hazards related to climate change she replied:

> No, I expect the municipality to have an ROS (Risk and Vulnerability) analysis and a contingency plan as well as a crisis team available as they are legally required to by Norwegian law.
>
> (Lena, from Byneset)

Through continuing this line of questioning and asking Lena if she believed that the support that the local actors provided to her community after a hazardous event was adequate, she replied:

> There was a good effort from the NVE (the Norwegian Water Resources and Energy Directorate) and the civil defence during the landslide in 2012. However, they are an only a short-term emergency response. The follow-up from the municipality was rather poor, and the best help was from the local community and local Bondelag.
>
> (Lena, from Byneset)

Conversely, the responses from the two case communities of Nepal showed that rather than receiving support from local and/or national government bodies or financial institutions the

research participants relied more on the support of community based organisations as well as occasionally from international organisations.

Responses from the research participants in Fulbari and Patalekhet were similar to the responses from the research participants in Byneset and Rissa regarding the assistance needed for daily tasks. The support needed for these smaller tasks would always be provided by members of the respective communities in Nepal regardless of caste or gender. Although people from different groups in these communities still receive support from their community, it is important to note that the amount of support which they are likely to receive would probably be less than that of the male Brahmin group.

Respondents also highlighted the support which the local community was able to provide for particularly laborious activities like the reconstruction work of damaged homes after the 2015 earthquake or the collection of harvest using the traditional Parma system. However, when it came to receiving financial support, unlike in Norway, responds stated that they could not rely on the government and had to rely on local community run organisations. There was only one example, which was given by every participant from the two communities, in which participants stated that they received money from the government and that was the home rebuilding financial scheme established using the international emergency aid money donated to Nepal after the 2015 Gorkha earthquake. Respondents from the two communities told this study that the government had promised a maximum of 300,000 Nepali Rupees (~US$ 2,684) to anyone whose home was either destroyed or damaged by the earthquake. However, given the instability of the Nepal's political system and the fact that the government had never had the experience of dealing with such a large quantity of money at one time throughout its entire history, many of the respondents replied stating that the government had poorly managed the international aid funds and had taken too long to provide the rural communities with financial support. In addition, many of the respondents informed the study that they would only receive funding in small segments, of 50,000 Nepali Rupees (~US$ 447), after they had provided evidence that they were rebuilding their homes to the standards set by the government. These standards required recipients to build the foundations of their homes out of concrete and use steel beams for the frames. These rules

and requirements set out by the national government of Nepal has led to a slow rebuilding process with many homes being noted as still completely destroyed or only partially reconstructed during the fieldwork conducted for this thesis in the late months of 2018, more than 3 years after the initial earthquake. Fulmaya, 63-year-old farmer and social mobiliser from Fulbari, commented that she had so far received 200,000 Nepali Rupees (~US$ 1,788) from the government and that she was still waiting to receive the final 100,000 Nepali Rupees (~US$ 894). Cheta, 46-year-old Dalit from Fulbari, told us that he was not aware of the strict penalties for the spending of the money provided by the government. He believed that the costs of repairing his home would not be as much as 300,000 Nepali Rupees so he spent the first 50,000 Nepali Rupee instalment given to him by the government on paying off some of his personal debts. However, Cheta told us that after the government officials visited his community to inspect the process of the reconstruction work and realised that he had spent the money not on his home but on his debts, the government removed him from the scheme and he longer received any financial support from the government. Lastly, Batuli, a 43-year-old female Dalit and farmer from Fulbari, said that she had received the full 300,000 Nepali Rupees from the government to rebuild her home but because the concrete and steel beam requirements, which are relatively high cost construction items in these communities, the funding from the government only covered less than half of the total cost of rebuilding her home, which actually between 700,000-800,000 Nepali Rupees (~US$ 6,258 – 7,152). In addition to financial support after the earthquake, many research participants responded stating that they had received support, in the form of building materials, blankets, daily essentials, etc., from international organisations. Ramesh, 25-year-old Brahmin, farmer from Patalekhet, told this study that international organisations such as Caritas had provided his family with as beforementioned support through a local women's group, called Hasera, which is mother was a member of. However, many of the respondents from both communities stated that they believed that the INGO's did not provide sufficient support in the aftermath of the disaster, rather many respondents felt that the INGO's had arrived for publicity sake and then left without providing any lasting resilience building support. Therefore, all of the respondents felt that the best form of support they receive is from family and the community as a whole.

Whilst it has been previously mentioned that the sense of community in the Fulbari community has been fading over recent years, many respondents replied that they rely mostly on local organisations and community support groups in times of need. They stated that support comes from the community cooperative rather than individual members of the community. Fulmaya told us that she is a member of the local cooperative which has a membership of around 300 community members and has an office in the local Fulbari community. This cooperative can offer loans to its members of up to 200,000 Nepali Rupees (~US$1,788) in return for a deposit of the recipient's land and/or home receipts, said receipts are then returned to the owner once the loan had been repaid. To be a member of this cooperative each member must pay 100 Nepali Rupees (~US$0.90) per month. Given that this cooperative was established by the local community, has its office in the local community, and employs local community members to manage its accounts the local community members of Fulbari feel more of an ownership and connection to this cooperative than to a national agency or organisation and are therefore more willing to support it with their own earnings. Furthermore, the majority of the research participants from the Fulbari community responded that the amount of support which they perceived to get often matched the amount of support which they actually received from the local cooperative. In Patalekhet, support from the community was always perceived to be and was more than not actually higher than the support from the government. However, the type of community support was slightly different in Patalekhet than in Fulbari. Nirmala, a 31-year-old Brahmin and farmer from Patalekhet, explained that the Patalekhet did not have one large local cooperative, instead the support from the community came from smaller community organisations such as the women's group that she was a member of. The women's group that she stated that she was a member of called Aalika, which means "female friend" in Nepali. She said that the small groups in the Patalekhet community, like her Aalika women's group, meet once a month to discuss issues related to their members and their members specific area. Again, community members feel a greater connection to this type of community run group and therefore are more willing to financially support them. The women in the Aalika women's group pay 50 Nepali Rupees (~$US 0.45) to be a member of this group and can in return receive financial support in the form of 0% loans from the collective money raised, as long as they repay the money within 3 months of taking out the loan.

Summary of Strengths and Limitations:

Table 12: A summary of the strengths and limitations gained from the responses regarding perceived and received support.

Community	Key Findings
Fulbari	• Supportive community. • Financial assistance from the government under the home rebuilding financial scheme established and funded by foreign aid donations after the 2015 earthquake. • Strict guidelines for the receiving of financial assistance from the government. • Limited support from INGO's after the 2015 earthquake. • Financial support from local community cooperative.
Patalekhet	• Supportive community. • Financial assistance from the government under the home rebuilding financial scheme established and funded by foreign aid donations after the 2015 earthquake. • Strict guidelines for the receiving of financial assistance from the government. • Limited support from INGO's after the 2015 earthquake. • High levels of support from active local community groups.
Rissa & Byneset	• Supportive community • Financial support readily available, from Innovasjon Norge, to farmers who want to further their own development. • Financial subsidies from the government for farmers who live and produce products in more challenging climatic areas. • Perceived support at a local and national level. • Financial support for damages after a hazardous event. • Expected that the municipality has conducted ROS analysis and is prepared for disasters.

	• Good community support after a hazardous event.

4.1.5 Insurance

Insurance provides a community with a greater level of resilience in the aftermath of a disaster. Having insurance means that you are covered with some type of financial protection after a disaster and often acts as the first stage of the rebuilding process. Various members from all four of the studied case communities stated that they had used some form of insurance in the past after the impacts of a hazard related to climate change. However, the type of insurance which had been used by the respondents in Norway differed greatly compared to that which was used by the respondents in Nepal. In Norway every respondent stated that they owned some type of formal insurance, i.e. home, vehicle, life, crop, and/or animal insurance. The respondents that had used their insurance after a flood and/or a drought had damaged their home and/or business stated that after a surveyor had visited and assessed the damages, they received a specific amount of money to cover the damages. In certain cases where damages caused by climate related hazards were not covered by private insurers the respondents from Rissa and Byneset stated that they had received some compensation from the government. When asked about the coverage that the private insurers and government provide after a climate related disaster Sigurd, 47 year-old farmer from Rissa who recently experienced flooding, stated that they provide financial support but “they will probably not give you 100% of the damage costs, however, they may give you 80%”. Hans, from Rissa, backed this comment up with his own personal example. Hans told me that he had been given financial support from the government after a drought had severely damaged his crops when he was first transitioning his farm from a conventional commercial farm to an organic farm. He said that his harvest was dramatically reduced by the drought given that his crops no longer benefitted from the added nutrients in the chemical fertilisers and that they had not yet developed longer roots to reach deeper water sources.

> I had not changed all of my crops into organic friendly crops and so when it did not rain as much as it normally does, I lost a lot of crops. However, I received some money from

> the government. In these cases, you have to have documentation of your losses and the government will give you some financial support.
>
> (Hans, from Rissa)

The respondents from the two communities who had experience with claiming money through private insurers and/or the government stated that they were generally content with the support that they received.

However, Frida, from Rissa, mentioned that she had experienced loses which could not be recovered in monetary terms by the insurance companies. As mentioned previously, the drought in the summer of 2018 led to the forced slaughter of several of Frida's dairy cows. Frida said that since these cows were breeding cows, she expected to have them for many years and therefore she and her family had become close to these cows. Frida said that instances like hers could not be covered by financial insurance.

Additionally, many of the respondents stated that whilst insurance is a worthwhile expense, it is also one of their largest household expenses. Simon, from Rissa, told me that one of the first things he did when he returned to his farm, after living and working outside of the community for a number of years, was to sell half of the farming machinery. He said that he had spoken with his neighbours and had made agreements to either borrow their equipment or pay them to work on his farm with their machinery for certain periods of the year. By selling his equipment and paying his neighbours for their work, Simon said that he made a lot of money from the sales and reduced his insurance bills therefore allowing him to pay off his farm's debts quicker.

Whereas all of the respondents from Rissa and Byneset stated that they had some form of formal insurance, none of the research participants in the two Nepalese communities replied stating that they had any type of formal insurance. Many respondents from Fulbari and Patalekhet responded that, due to their low financial income, they could not afford or that they had no trust in many types of formal insurance. Therefore, instead of investing in conventional forms of insurance

many of the respondents stated that they invested in traditional forms of insurance. One of the common forms of traditional insurance invested in by farmers and rural community members in communities across Nepal is in owning cattle. Box 1 highlights how this style of traditional insurance is used and how recent development projects have improved its effectiveness as a source of insurance and a source of resilience.

Box 1. Rural insurance technique strengthened by community partnerships.

In both the Patalekhet and Fulbari communities most of the research participants responded saying that they do not own any type of formal insurance, such as home or medical insurance. Many of the respondents instead stated that they purchased and owned cattle which could be sold in case of an emergency. In the Fulbari community respondents explained that not only had this technique of insurance been used in their community for many generations but had been actively encouraged and promoted through recent community projects. Owning either female cows, oxen (castrated male bulls), or buffalo are beneficial to rural live as they can be used as a source of milk or as a draft animal used to plough fields, respectively. Therefore, owning these animals as an insurance policy is often more valuable, providing a potential source of food, labour, and income for households, than a formal insurance policy with a bank.

Figure 9 shows one of the respondents from the Fulbari community, Jamuna, recovering outside of her home after returning from a hospital in Kathmandu where urgent surgery was needed on her leg. Jamuna provides a great example of how cattle have been used in these communities as a form of insurance during emergencies. Jamuna spoke of how she had broken her leg after fainting whilst working in one of the fields of her farm. She stated that the amount of money in her savings account would not have been enough to cover the cost of transportation and medical treatment after spending most of her savings contributing to the cost of rebuilding her home after it was destroyed by the 2015 earthquake. Therefore, in order to bring about the 85,000 Nepali Rupees (~US$ 636) needed to pay for her operation she sold her buffalo, this generated 71,000 Nepali Rupees (~US$ 735) covering the majority of the expenses. Some of the respondents from the Fulbari community discussed how important this practice was to their community and how recent community lead projects had looked to use this practice to build stronger community resilience. A recurring topic during

Figure 9: Jamuna recovering outside of her home after a recent operation on her leg.

the course of the interviews in the Fulbari community was the importance of the community milk collection centre (see appendix G). Respondents stated that the centre had become a hub of the community and is therefore often where conversations regarding certain environmental hazardous are discussed. The centre was established by a local businessman who had grown up in this Fulbari community and therefore has a strong connection to the people and place. He runs the community milk collection centre and generates an income by buying milk from local farmers and selling it to markets in Kathmandu.

Over time a very strong relationship has been built between the community farmers and the owner of the community milk collection centre. The businessman has also been known to help the community farmers who are in financial trouble by providing them with a 0% interest loan of up to 50,000 Nepali Rupees (~US$ 447), which has to some been a lifesaving service after not being able to source money through bank loans. The community milk collection centre has provided farmers with a local and fair centre to sell their milk, previously respondents stated that they had to travel far, incurring financial costs related to

transport and reduced field labour, and get unfair prices for their milk. This business has therefore provided the community with a valuable source of income. The success of the community milk collection centre has encouraged many of the respondents to diversify their income by investing in dairy cows whilst also providing a traditional form of insurance.

Furthermore, respondents stated that through the local community cooperative information had been shared regarding biogas projects. The local community cooperative had worked with health and education for all (hefa) and ökumenischer eine-welt-kreis (öwk) to establish biogas plants outside the homes of community members (see appendix H). This project allowed members of the community who raised cattle to generate their own source of gas, which is the main source of fuel in the households of this community.

One research respondent from the Fulbari community, Indra, who owns 1 buffalo and 6 goats informed us that his household biogas plant was constructed, with the help of the community cooperative, hefa and öwk, 14 years ago in 2005. Indra said that by using the manure generated by his cattle to produce his own biogas that he had become more resilient. He said that an average 15kg tank of gas in kathmandu is 1,400 nepali rupees (~us$ 12) and is even more expensive when buying in rural areas. He said that he has been able to use this saved money to invest more in his cattle and diversify his income, thus generating more manure to make biogas. Indra also said that these community backed household biogas plants have made him and his community more resilient to outside shocks.

> *The shortage of gas during the Indian blockade did not affect me or the community as we had our own source of biogas within the community.*
>
> *(Indra, from Fulbari)*

In this Fulbari community the traditional insurance technique of owning cattle which can be sold in times of emergency has been built upon by the community to improve their resilience. Farmers now have the additional incentive to own dairy cows as a way to diversify their income through the easier sale of milk at the community collection centre. Further investment in owning more cattle, as another source of labour or income, has also been supplemented by the establishment of household biogas plants which reduce the household expenses by allowing the manure generated by cattle be used to produce gas for household use.

Summary of Strengths and Limitations:

Table 13: A summary of the strengths and limitations gained from the responses regarding insurance.

Community	Key Findings
Fulbari & Patalekhet	• Formal forms of insurance too expensive for farmers. • Traditional insurance through cattle owning has been modified and improved towards community development and resilience.
Rissa & Byneset	• Insurance is a large expense for farmers. • Respondents content with financial support from private insurers and the government.

4.2 Community capacity

4.2.1 Local understanding of risk

As previously mentioned in chapter 2, the main hazardous events that the two communities in Fulbari and Patalekhet, in Nepal, have most notably and recently experienced have been the 2015 Gorkha earthquake and the recurring and ongoing droughts. Furthermore, the communities of Rissa and Byneset have mostly been impacted by the effects of too much or too little precipitation, and quick clay landslides. However, in order for this study to gain a clearer understanding of how risks are perceived by members of the communities' themselves the aforementioned hazards were not targeted through the interview process. Rather the questions asked to the respondents were left open, thus allowing the participants to give their own perceptions and personal accounts of risks related to climate change. Of course, most of the research participants focused on the main risks of earthquakes, droughts, flooding, and quick clay landslides as these have had the largest and most recent impact on their lives. However, by leaving the questions regarding risk perception open for the participants to interpret, this thesis learned that three research participants from the Patalekhet community and one from the Rissa community had also experienced multiple large wildfire events.

Through the conducting of the interviews with the community members of the Fulbari and Patalekhet at their homes and in their local community first-hand observations of the effects of climate change on these communities was witnessed. Whilst still apparent, the effects of climate change on the community of Patalekhet and the community in the North facing side of Fulbari were not as severely felt as they were in the community in the South facing side of Fulbari. The community in the South facing side of the Fulbari had in recent years been noticeably impacted by several severe droughts. The community in Patalekhet and in the North facing side of Fulbari whilst also affected by the effects of the regional drought, still received enough moisture to diversify their crops to include water intensive cash crops such as high-priced tomatoes and squashes. The largest cash crop for the community in the South facing side of Fulbari is Mustard plants, however, like the vegetables grown in Patalekhet, mustard plants are also water intensive and not drought resistant. With a lack of proper irrigation, the South facing Fulbari community is very highly dependent on rainfall as its major source of water for its Mustard plants. However due to CC, mountainous communities in the HKH like those in Patalekhet and Fulbari have in recent years experienced less rainfall outside of monsoon seasons, which have caused prolonged periods of droughts. Furthermore, the rainfall outside of the monsoon season in previous years was more predictable, which meant that farmers had evolved in these communities to plant Mustard plants during these predicted rainfall periods. However, CC has caused the rainfall in these communities to become less predictable and is therefore having dramatic effects on the harvests of many farmers. Many of farmers who responded from the South facing Fulbari community expressed their concern over the ongoing drought:

> It should have rained already; it has been 4 months without a single drop. Without water, my mustard plants have only grown to half of their full size.
>
> (Kamala, from Fulbari)

> The unpredictability of rainfall has caused havoc on the planting seasons in the community. People no longer know when to plant their crops anymore to avoid dry

> periods. Rainfall was expected from October to December and so many have planted their mustard plants at the start of this season, but it has not rained yet this year.
>
> (Maheshwor, from Fulbari)

> The lack of water has caused a massive reduction in the growth of my mustard plants. The water scarcity is so bad that now that I have harvested my corn, I am unable to plant anymore.
>
> (Batuli, from Fulbari)

Even members of the Fulbari community who have their fields on the North facing side of the Fulbari stated their concern over the increasing severity of droughts in their community:

> Year, on year, on year the rainfall becomes less. Because my fields are on the North facing side, I used to be able to rely on dew drops to water my crops, now I don't even have that. This year I have lost around 60% of my crop yield.
>
> (Indra, from Fulbari)

With the inability to grow either water intensive vegetables or sufficient yields of Mustard plants in the South facing side of the Fulbari, the community's perception of risk is heavily associated with the increasing severity and unpredictability of droughts caused by CC.

Whilst, the community in Patalekhet has also been severely impacted by the 2015 earthquake and several droughts over recent years they still often do not perceive these hazards as risks. One Possible reason for this is that most of the community members interviewed had their own household plastic water storage pond and had fields on the North facing side of the community, therefore had greater access to sources of water than those in the South facing side of Fulbari. Thus, the respondents from Patalekhet did not recognize the increasing severity of droughts as a major risk for their community. Instead many of the respondents from the Patalekhet community

Figure 10: Close up images of the damage and reduced yield of the mustard plants caused by ongoing drought in the South facing Fulbari community.

Figure 11: A wide shot of some of the fields on the South facing side of the Fulbari community showing the aridity of the area.

Figure 12: The lushness available on the North facing side of the Fulbari community.

responded that the current socio-economic issues affecting them were the largest risk to their community. Although some hazards related to CC, other than increased water scarcity, such as increased occurrences of "blight" and "aphid" at high altitudes negatively impacting their crops, most respondents from the Patalekhet community did not see these hazards as a major risk to their community.

> During community meetings or meetings with NGO's we rarely discuss future hazards related to climate change. I don't care about these future hazards because the current problems are more pressing.
>
> (Ramesh, from Patalekhet)

In Patalekhet the perception of risk is more related to current issues affecting the community such as market access and manpower. All respondents stated that droughts were the primary hazardous issue related to climate change, but most had little concern over it. Most stated that they were unaware of any groups which were formed to deal with such issues and that the groups which did exist did not discuss these topics only current issues regarding market access, manpower, cropping techniques, vegetable seeds, cold storage boxes, plastic tunnels etc. The recent development in the community's resilience through the increased crop diversity and income diversity has maybe left some of the residents of the Patalekhet community unaware of the risks posed by CC and the future increased drought severity. However, one of the elders in the Patalekhet community, Ganesh, informed this study that even though the community has managed to build up its resilience levels in recent years, the many hazardous events related to climate change which have been experienced in the community's past cannot be forgotten. This elder told us that he believed that the current water shortages and droughts in the community are the most important hazardous issues which has to be addressed. However, he added that there is no initiative or readiness in the community to deal with these potential climatic hazards stating that the community "are not educated enough on these issues".

In the Rissa and Byneset communities many of the research participants responded stating that they were very aware of the future risks that climate change may have on their communities.

However, the replies given by the respondents from both communities varied with regards to receiving information from local actors regarding the impacts of climate change. Sigurd and Simon, from Rissa, stated that they had been provided information, with regards to the future threats of climate change, by their local authorities and local actors through meetings and delivered booklets with the local municipality and the local bondelag, respectively. They stated that they had been informed that their communities are likely to experience highly levels of precipitation in the years to come which may affect their harvests and the frequency and severity of flooding. However, other respondents from Rissa informed me that they do not believe that they had been informed sufficiently by the local authorities and actors about the future impacts associated with climate change. Idunn and Frida both replied stating that they certainly did not believe that the local authorities had communicated enough with the local community members about the precise impacts climate change will have for them. Oda and Eirin, from Byneset shared similar feels of a lack of knowledge sharing from the local authorities with the local community members. Eirin stated that she had not received any public information about the future impacts of climate change in her community but that the information was available online if an individual wanted to find it.

Lena, from Byneset, suggested that because most of the people in Byneset have lived their entire lives in the community that they have been brought up with the risks of quick clay landslides "with their mother's milk". Therefore, Lena suggested that the local authorities did not feel the need to patronise farmers by informing them of the future risks of quick clay landslides in their area. Lena, who is a GIS advisor for the local municipality, stated that she was aware of the future risks which threaten her community but that she had not been directly informed by local authorities, rather she had learned these risks through her work. Lena also gave a personal example of her experiences with quick clay landslides and the lack of information before an event compared to after an event. Lena informed me that in 2012 a large quick clay landslide occurred on the outskirts of her property. Lena provided me with goggle earth satellite images of the area of her property which were affected by the landslide in 2012, see figures 13 and 14. From these satellite images it is easy to see the clear extent of damage which quick clay landslides can have on individuals in the Byneset community. Lena stated that she felt lucky that

her home was not damaged by the landslide but was aware that her property lies in a quick clay zone and could be affected in the future. Whilst she mentioned that before the 2012 incident she had little awareness of the precise extent of the threat her home and farmland were under, surveys and monitoring stations implemented after by NVE have given her a better understanding of risk and made her feel safer. However, she despite these actions she still states that the threat of quick clay landslides is her farms greatest concern and that the local authorities should do more to inform people directly before an event like hers occurs.

The responses from the research participants from both communities implied that they are aware of the general risks of climate change in their communities, i.e. flooding and quick clay landslides, but believed that the local authorities and local actors should actively do more to inform them of more exact impacts they should expect. In addition, many of the respondents from both communities stressed that they were concerned about the future impacts of climate change on the profitability of their farms. However, they also stated that because of their good previous experiences with insurance companies and the national government in receiving financial support after a disaster that they did not see these future issues as needing urgent action to prepare for.

Summary of Strengths and Limitations:

Table 14: A summary of the strengths and limitations gained from the responses regarding local understanding of risk.

Community	Key Findings
Fulbari	• High level of awareness towards the future impacts climate change. • Droughts associated with CC are the respondents' top concern.
Patalekhet	• Little concern given to droughts by the respondents, who are more concerned with market access, manpower etc. • Lack of awareness towards the future extent of the impacts of CC.
Rissa & Byneset	• Respondents are aware and concerned with CC but do not believe that their local actors have provided them with enough specific information.

Figure 13: Image of Lena's farm in Byneset before the 2012 quick clay landslide.

Figure 14: Image of Lena's farm in Byneset after the 2012 quick clay landslide.

4.2.2 Volunteering/community groups

Actively volunteering or being a member of a community group demonstrates an interest in and commitment to the development of a community. Examining these factors provides a way to gauge how much time and effort individuals are willing to put into their community.

Many of the respondents from the two communities in Norway responded stating that they are members of various groups and organisations in their local area such as OIKOS, Norsk Bonde- og Småbrukarlag, and the Sør-Trøndelag Bondelag. Hans, from Rissa, informed me that he was a member of OIKOS an ecological organisation whose membership is open to anyone in Norway who wants a better, healthier and more just world and has a vested interest in organic food and agriculture including farmers, companies, and ordinary customers. He said that OIKOS often organise local activities and events in his community and in the rest of the Sør-Trøndelag county. He highlighted how their work through events such as Trøndersk food festival, open organic farm and ecological weeks they are helping to encourage the production and purchase of organic products and thus reduce the negative environmental impacts that conventional commercial farming are having on his community. Hans stated that personal membership costs 390 Norwegian Kroner per year and for that you will help fund a worthwhile cause whilst also receiving information regarding ecologically friendly strategies for everyday life as well as information about upcoming events.

Additionally, all of the research participants from both Rissa and Byneset stated that they were members of either the Norsk Bonde- og Småbrukarlag or the Sør-Trøndelag Bondelag. The Norsk Bonde- og Småbrukarlag, Norwegian Farmers and Small Farmers Team, is an independent political party organisation in Norway, with around 7,000 members, that works to improve Norwegian agriculture's economic and social framework. Many of the respondents who owned relatively smaller farms informed me that they were a member of this small farmers team. Many of these respondents stated that the Norwegian agricultural industry is very competitive and that there are many large companies and larger farms that are trying to squeeze out the smaller farmers. Therefore, these respondents felt that being a member of the Norsk Bonde- og

Småbrukarlag provided them with a community which could provide relevant support and guidance given that they also have a similar farm size and face similar challenges. Furthermore, all of the respondents stated that they were members of the Bondelag, which is the largest trade union specifically for farmers in Norway with over 63,000 members. The respondents stated that they were members of the Sør-Trøndelag Bondelag as it was the regional branch of the national Bondelag who they wanted to support as they fight for the support of farmers in Norway's political spheres. The respondents also stated that being a member of the Bondelag in Norway means that you are able to receive direct support from them on issues such as accounting, law, tax, agricultural techniques, and climate consulting when needed. Whilst the respondents from both communities in Norway stated that being a member of large organisations such as OIKOS, Norsk Bonde- og Småbrukarlag, and the Sør-Trøndelag Bondelag helped to provide them with individual financial and practical support, many of the respondents stated that volunteering and community activities were better at providing social support for their community. Such volunteering and community activities were said to include assisting at local schools and churches organising specific events and days out for the children or specific groups in the community. Additionally, respondents stated that they also took part in annual area clean ups such as the nationally organised clean ups run by Hold Norge Rent, where community members volunteer their time and energy to clean up litter in their community.

> By volunteering to clean up the litter in nature we are working as a team to raise awareness about our impacts on the environment and how we can collectively overcome future challenges as a community.
>
> (Sigurd, from Rissa)

These activities were seen by the respondents as a productive way to help build a sense of community within their respective community.

However, whilst the respondents from both the Norwegian communities stated that they were members of large organisations and actively volunteered in their local community, none of the

respondents stated that they knew of any local community group which was organised by community members to deal with issues specific to their community.

In the Patalekhet community, respondents stated that their main activity and/or membership in their community was being part of a local community group that was designed to tackle certain issues specific to their area. Many of the female respondents from Patalekhet stated that they were a member of a local women's group, called Aalika. They stated that women's groups helped them feel more confident and secure in their community as they knew that they had a group of likeminded women who were available to provide educational and financial support when needed. Other groups in the community such as the local Hanuman group, named after the Monkey God in Hinduism who often represents strength and energy, was established in the Patalekhet community with the help of CEAPRED. The Hanuman group meets regularly with CEAPRED to share information and strategies between the two groups towards further developing the local Patalekhet community. However, whilst these groups existed in Patalekhet and helped improve certain community specific issues, such as the empowerment of women in the community, the respondents stated that these community groups did not meet to address issues related to climate change and that they did not know of any groups in their community which did.

In the Fulbari community, very few of the respondents mentioned that they were part of any local community group, which was actively trying to tackle current challenges threating the community. Only Maheshwor mentioned any type of group active in the Fulbari community. Maheshwor stated that there was an informal group of around 35-40 male dairy farmers in the community aged between 18-60 who helped to raise funds and carry out manual labour tasks to assist those in need in his community. Jamuna mentioned that there was once a women's group in the community called Aatma Nirvar Cooperative, Soul Dependent Cooperative, which had formed, with assistance from ICIMOD & CEAPRED, to provide financial training for women. However, even though they had regular meetings and discussions she believed that they did not have enough knowledge of the solutions for this complex issue to make any real changes and therefore the group disbanded over time. One of the reasons previously given in section 4.1.3 for

the low number of local community groups in the Fulbari community is the recent establishment of the local community cooperative and VDC. The majority of the respondents from the Fulbari community stated that they were members of the local cooperative. The local cooperative in Fulbari provided its members with financial and educational support when needed by the farmers, such as the information and finances needed to establish a household water harvesting pond. This Fulbari community cooperative is a major source of assistance in the Fulbari community and whilst it does not solely deal with the impacts of climate change, given that the impacts of climate change are so large for the Fulbari community, it is often able to provide local farmers with support on these issues.

As previously mentioned, the main form of voluntary work which respondents from both the communities in Nepal stated that they took part in was the voluntary work related to the parma, community harvesting, system.

Summary of Strengths and Limitations:

Table 15: A summary of the strengths and limitations gained from the responses regarding volunteering/community groups.

Community	Key Findings
Fulbari	• Very few locally active community groups. • Local community groups do not address concerns regarding climate change. • Local cooperative provides members with financial and educational support. • Community volunteer work through the parma system.
Patalekhet	• Many locally active community groups. • Local community groups do not address concerns regarding climate change. • Community volunteer work through the parma system.

Rissa & Byneset	• High membership of farmer and agriculturally focused organisations, such as OIKOS, Norsk Bonde- og Småbrukarlag, and the Sør-Trøndelag Bondelag. • Respondents believe that organisational membership provides financial and practical support to individual farmers and members. • Participation in volunteering and community activities seen as the best approach for providing social support for the community by respondents. • No local community groups tackling local issues.

4.3 Information and communication

4.3.1 Information

Information provided to local communities regarding the future impacts of climate change in their local area is essential for them to be able to understand the risks they face and the tools that are needed to prepare for these risks.

Many of the respondents from Rissa and Byneset told me that they do not actively pursue regular communications with their neighbours or other community members. Therefore, they said that they receive limited relevant information from other members of their community regarding issues and techniques to prepare for the impacts of climate change. Eirin from Byneset said that she normally gets her everyday news regarding her community from the NRK website, radio, and newspapers, or when she wants to find out something specific, she told me that she will deliberately seek out and talk to a local actor, such as the Bondelag. The majority of respondents from both Byneset and Rissa responded stating that they had not received direct information regarding future hazards related to climate change from their local authorities. Rather they stated that the focus is on self-preparedness, some respondents replied saying that they have not been told about future hazards but had been given the necessary sources to search and/or contact if they were concerned with anything.

All of the respondents from Norway responded that since their localised hazards are normally climate related, checking information regarding the weather from online websites (such as Yr.no), radio, and tv news channels has become a daily necessity. Furthermore, all residents responded saying that they had access to at least 3g mobile coverage but were often covered by 4g. These technological advancements have proven to be a vital life line in these communities and better prepares them for the weather predicted for the rest of the week and month. Respondents stated that this allows them to better plan their harvesting timing as well as preparing for climatic impacts such as flooding. Lastly, Hans from Rissa told me that "in Norway websites are a trusted source of information" and are more commonly used as a source of assistance than communications with neighbours or other community members.

For both the Patalekhet and Fulbari communities the lack of smartphones and reliable internet connections means that many people do not access the internet for information and those receive the majority of their local information through face-to-face communications. Additionally, many of the respondents from both communities stated that second to face-to-face communication they receive most of the information from outside of the community through television which they have in their homes. With regards to building resilience in these communities various NGO's and INGO's meet with community members from Fulbari and Patalekhet regularly to discuss local issues and provide new techniques to mitigate the impacts of climate change as they become available. ICIMOD has also in recent years worked as a medium between villages whereby farmers can share information with and learn from model villages. ICIMOD also own a knowledge park in Godavari where farmers can come to see sustainable agricultural techniques in practice and learn which techniques are best suited to their local issues.

Summary of Strengths and Limitations:

Table 16: A summary of the strengths and limitations gained from the responses regarding information.

Community	Key Findings
Fulbari & Patalekhet	• Information shared between community members. • Regular visits from local actors to share information.

	• Model villages and knowledge parks established by ICIMOD share valuable information and teach agricultural techniques relevant to community members' local issues. • Lack of internet and technological access limits the amount of information available to respondents from online sources.
Rissa & Byneset	• Lack of information shared between community members. • Access to internet and technology allows farmers to independently find information from online sources.

4.3.2 Communication between community members

This section of the thesis examines how and how often members of the same community communicate with each other. This study noted that the two communities in Norway had greater access to the internet and larger technological devices, such as laptops and computers, than those in the studied communities in Nepal. However, whilst none of the local community members from either Fulbari or Patalekhet replied during the interviews stating that they owned a laptop or a computer, the majority did reply that they owned or had access to an internet enabled smart phone. Therefore, whilst few of the respondents from the two communities in Nepal stated that they had an active email account, other than a temporary one to activate a social media account, even fewer of the respondents of the two Norwegian communities replied that they communicate with other members of their community via email. Consequently, they stated that they do not use their laptops or computers to regularly communicate with their local community members. Therefore, technological differences between the two communities in Nepal and the two communities in Norway had no impact on the comparison between the communities from the two countries.

In all four communities, communications with other community members, outside of face-to-face meetings, was conducted using a mobile phone. In the two Nepalese communities, often communication through the use of mobile phones would be used to arrange a face-to-face meeting, such as a dinner or assistance with farm tasks. Members from both communities stated

that whilst doing tasks outdoors they would often engage in communication with other community members, with this occurring more often and for longer periods of time in Patalekhet than in Fulbari due to the drought there. As mentioned in section 4.1.3, sense of community, the Fulbari community members communicate with those outside of their small social circles much less than the Patalekhet community. However, both communities stated the most common and favoured form of communication with other community members is face-to-face communication.

The community members from both Rissa and Byneset replied stating that whilst they felt a strong sense of community in their respective communities, they did not actively seek out common communications with members of their community. The majority of the respondents stated that whilst communication was always open and available it was not sought out. Rather community members would only communicate when they occasional met for whatever reason somewhere in the community. Most respondents stated that they preferred face-to-face communications with the other community members but given peoples busy lives and time constraints it was becoming more common to communicate over the phone or through social media. Frida, 44-year-old female farmer from Rissa stressed these points when she, rather mechanically, stated that she communicates with her other community members as and when it suits her needs. Therefore, whilst it may be true that the two communities in Norway feel a stronger sense of community than, specifically, the Fulbari community in Nepal it is likely that this sense of community does not stem from long and regular conversations with other community members.

Summary of Strengths and Limitations:

Table 17: A summary of the strengths and limitations gained from the responses regarding communication between community members.

Community	Key Findings
Fulbari	• Face-to-face communications are preferred. • Wide usage of smart phones, normally to set up face-to-face meetings.

	• Face-to-face meetings reduced due to poorer harvests.
Patalekhet	• Face-to-face communications are preferred. • Wide usage of smart phones, normally to set up face-to-face meetings.
Rissa & Byneset	• Regular communications with community members not actively pursued. • Face-to-face communications are preferred by most of the respondents but it is becoming more common to talk to others in the community using a smart phone.

4.3.3 Communication between community members and local actors

When comparing the ability of local community members to communicate with their local actors in the communities of Nepal and Norway it was shown that both had access to key figures in their local actors but to varying degrees. Members from both of the communities in Norway had greater internet coverage than the two communities in Nepal, as well as greater access to technology. Therefore, the respondents from the two Norwegian communities replied that they had easy access to their local actors as they could find their information online, for example through the Bondelag website, and either directly call or email the respective local actor. Many of the respondents from the two Norwegian communities therefore replied that they had open communication lines with their local actors.

> The Bondelag are just a phone call away.
>
> (Eirin, from Byneset)

Alternatively, the regional branch of the Bondelag had its office in Trondheim city. This regional office was close enough for the respondents from both communities to say that they could schedule an appointment and attend a face-to-face meeting with a representative from the Bondelag at a mutually beneficial time. The respondents from Rissa and Byneset replied stating that it was uncommon for local actors to schedule meetings with community members, unless

there had recently been a major environmental event such as the quick clay landslides in Byneset in 2012.

Whereas, the community members in the Fulbari and Patalekhet communities had less access to the internet and technology, such as laptops and/or computers, and therefore replied stating that they had less direct and immediate access to their local actors. Furthermore, unlike the Norwegian communities, the two studied communities in Nepal replied that they often could not give up the time or money to go and visit their local actors at their establishments, instead they relied on the actors coming to their communities. However, respondents replied that they felt satisfied with the number and regularity of the visits from the local actors to their communities. The community groups in Patalekhet, such as the women's groups, stated that the local actors, in this case CEAPRED, scheduled monthly meetings with the groups to get updates and discuss relevant issues. Occasionally, the national agricultural ministry of Nepal would also attend these meetings. Whilst, the members of each community stressed that they could not travel to visit the local actors they also stated that leaders in their communities had the contact phone numbers of the representatives of the local actors and therefore gave them a more direct line with the local actors in order to arrange specific community visits in the future.

Summary of Strengths and Limitations:

Table 18: A summary of the strengths and limitations gained from the responses regarding communication between community members and local actors.

Community	Key Findings
Fulbari & Patalekhet	• Regular visits from local actors to discuss current issues in the community. • Lack of access to internet and technology limited the speed of communications between community members and their local actors.
Rissa & Byneset	• Infrequent scheduled meetings between local actors and community members. • Open and fast communications between community members and local actors assisted by internet and technology.

5 Discussion

In this chapter the main findings of this thesis will be discussed, comparisons between the communities from the two countries will be made, and recommendations for improving the levels of community resilience in the studied case communities will be presented.

5.1 Discussion of the main findings

The strengths and limitations currently present in the community resilience of the four rural case communities have been identified and presented in table 19 below. This thesis defines the strengths listed in table 19 as factors which contribute towards enhancing the overall level of the community's community resilience. Limitations are defined as factors which contribute towards diminishment of the community's overall level of community resilience. These strengths and limitations are based off of the empirical qualitative data collected from the four case communities of Patalekhet, Fulbari, Rissa, and Byneset. The qualitative data collected for this thesis was gathered through my own work and therefore somewhat subjective interpretations and conclusions of the data available are unavoidable.

Table 19: Strengths and limitations which have had an impact on the communities' level of community resilience.

	Strengths	Limitations
Patalekhet (Nepal)	• Sense of attachment to place. • Sense of pride in the beauty and safety of the community. • Evidence of community unity to support each other after a large hazardous event.	• Pressures to leave growing stronger. • Pessimistic feelings about the future of the community concerning the outmigration of the youth.

	• Strong sense of community. • Participation in community gatherings. • Community volunteer work through parma system. • Better harvests lead to more interactions with neighbours and a more effective parma system. • High level of community involvement through local community groups. • Large events help to maintain the sense of community. • Supportive community. • Financial assistance from the government under the home rebuilding scheme established after the 2015 earthquake. • High levels of support from active local community groups. • Traditional insurance through cattle owning has been modified and improved towards community development and resilience. • Many locally active community groups. • Wide usage of smart phones.	• Strict guidelines for receiving financial assistance for the rebuilding of homes under government scheme. • Limited support from INGO's after 2015 earthquake. • Formal forms of insurance too expensive for farmers. • Little concern given to droughts by the respondents, who are more concerned with market access, manpower etc. • Lack of awareness towards the future extent of the impacts of climate change. • Local community groups do not address concerns regarding climate change. • Lack of access to internet and technology limiting communications between community members and local actors.

	• Regular visits from local actors to discuss local issues and share new information. • Information regarding new development projects shared between community members. • Model villages and knowledge parks established by ICIMOD.	
Fulbari (Nepal)	• Sense of attachment to place. • Sense of pride in the beauty and safety of the community. • Evidence of community unity to support each other after a large hazardous event. • Large events help to maintain the sense of community. • Supportive community. • Financial assistance from the government under the home rebuilding scheme established after the 2015 earthquake. • Financial support from local community cooperative. • Traditional insurance through cattle owning has been modified and improved towards community development and resilience.	• Pressures to leave growing stronger. • Pessimistic feelings about the future of the community concerning the outmigration of the youth. • Sense of community diminishing. • Climatic changes have negatively affected traditional community customs, i.e. effectiveness of the parma system has been reduced. • Diminishing household incomes and household income inequalities (between migrant and non-migrant sending homes) highlighted as a driver of erosion in the local sense of community. • Lack of initiative to form local groups. • Establishment of VDC has potentially led to a reduction in community involvement.

	• High level of awareness towards the future impacts of climate change. • Droughts associated with climate change are the respondents' top concern. • Local cooperative provides members with financial and educational support. • Community volunteer work through the parma system. • Wide usage of smart phones. • Regular visits from local actors. • Information regarding new development projects shared between community members. • Model villages and knowledge parks established by ICIMOD.	• Strict guidelines for receiving financial assistance for the rebuilding of homes under government scheme. • Limited support from INGO's after the 2015 earthquake. • Formal forms of insurance too expensive for farmers. • Very few locally active community groups. • Local community groups do not address concerns regarding climate change. • Lack of access to internet and technology limiting communications between community members and local actors. • Lack of internet and technological.
Rissa (Norway)	• High sense of attachment to place. • Sense of attachment to place stronger than pressures to leave. • Sense of pride in the beauty and safety of the community. • Optimistic feelings about the future of the community concerning the outmigration of the youth.	• Expectations for the municipality to conduct ROS analysis and be prepared on behalf of community members without the initiative to follow up and check if such work has been done. • Insurance is a large expense for farmers. • Respondents believe that their local actors, such as the local municipality, have not provided them with enough

	• Respondents stated no long term mental or physical effects because of climatic conditions. • Culture (koselig) and sense of community provide some social support. • Government and insurers provide some reassurances. • Shared cultural values contribute towards sense of community. • Supportive community. • Financial support readily available, from Innovasjon Norge, to farmers who want to further their own development. • Financial subsidies from the government for farmers who live and produce in more challenging climatic areas. • Financial support for damages after a hazardous event. • Good community support after a hazardous event. • Respondents content with financial support from private insurers and the government. • Aware and concerned about the impacts of climate change.	specific information about climate change. • No local community groups tackling local issues, such as groups existing of local community members working towards mitigating the risks of quick clay landslides. • Regular communications with community members not actively pursued. • Infrequent scheduled meetings between local actors and community members. • Lack of information regarding climate change related development work shared between community members.

	• High membership of farmer and agriculturally focused organisations. • Participation in volunteering and community activities. • Wide usage of smart phones. Open and fast communications between community members and local actors assisted by access to internet. • Access to internet and technology allows farmers to independently find information from online sources.	
Byneset (Norway)	• Sense of attachment to place. • Sense of attachment to place stronger than pressures to leave. • Sense of pride in the beauty and safety of the community. • Optimistic feelings about the future of the community concerning the outmigration of the youth. • Respondents stated no long term mental or physical effects because of climatic conditions. • Culture (koselig) and sense of community provide some social support.	• Expectations for the municipality to conduct ROS analysis and be prepared on behalf of community members without the initiative to follow up and check if such work has been done. • Insurance is a large expense for farmers. • Respondents believe that their local actors, such as the local municipality, have not provided them with enough specific information about climate change. • No local community groups tackling local issues, such as groups existing of local community members

	• Government and insurers provide some reassurances. • Strong sense of community. • Shared cultural values contribute towards sense of community. • Supportive community. • Financial support readily available, from Innovasjon Norge, to farmers who want to further their own development. • Financial subsidies from the government for farmers who live and produce in more challenging climatic areas. • Financial support for damages after a hazardous event. • Good community support after a hazardous event. • Respondents content with financial support from private insurers and the government. • Aware and concerned about the impacts of climate change. • High membership of farmer and agriculturally focused organisations. • Participation in volunteering and community activities. • Wide usage of smart phones.	working towards mitigating the risks of quick clay landslides. • Regular communications with community members not actively pursued. • Infrequent scheduled meetings between local actors and community members. • Lack of information regarding climate change development work shared between community members.

	• Open and fast communications between community members and local actors assisted by access to internet and technology. • Access to internet and technology allows farmers to independently find information from online sources.	

As can be seen from table 19 the number of limitations identified in the Fulbari community appears to be higher than in any of the three other communities. One explanation for this may be that areas in this community have recently and are currently suffered from more extreme impacts of climate change than any of the other communities. Given the lack of support from outside sources farmers are solely reliant on the resources of the community. Whilst there are certain local organisations which help increase the development of the community, such as the local VDC and cooperative, these organisations may have replaced the traditional locally organised groups which helped strengthen the sense of community in the community.

Out of all four case communities studied in this thesis the respondents from the Fulbari community responded with the lowest sense of community. One reason given for this particularly low sense of community was the new leadership role that the VDC was playing in the community. It was suggested by Sudarshan that the community had lost its sense of community because the VDC now makes decisions for the development and resilience building activities on its own without properly involving the community. Therefore, this thesis would suggest that, to help strengthen the sense of community in the Fulbari community, the VDC better incorporate the community members more in local decision-making process and provide them with specific roles and/or tasks on the planned new local development projects. By comparing the two Nepalese communities the Fulbari community could possibly create similar locally active groups, such as the Aalika women's group in Patalekhet, thus organising specific

times every month for women in the community to meet and build their sense of community whilst discussing issues related to them or their particular area in the community. This same technique could also be applied to the two Norwegian communities who whilst having a strong sense of community had low levels of communication with their neighbours and lacked any form of local community group who were organised to address local issues, such as for instance quick clay landslide monitoring and preparedness. Local community groups proved to be a large success in the Patalekhet community with respondents from there stating that membership to such groups helped them gain new sources of financial and educational support as well as an opportunity to meet with other community members, thus enhancing their sense of community and social networks. Local community groups in Rissa and Byneset could also provide reason for local authorities and actors, such as the Bondelag, to establish regular meetings with members of the community to discuss local issues and new techniques, like is the case between the local community groups in Patalekhet and CEAPRED. These meetings could offer local actors and authorities the platform to tackle one of the major limitations noted in the community resilience for the two communities in Norway, which was a feeling of a lack of specific information regarding the effects of climate change in these communities.

Additionally, the local authorities and actors who work with the two Norwegian communities could also implement similar information sharing techniques that have been used by INGO's, such as ICIMOD, to enhance the levels of community resilience in the two Nepalese communities. The knowledge parks and model villages which have been established by ICIMOD in Nepal provide small farmers with the concrete information which is relevant for them and their community. The knowledge parks provide a centre for learning where farmers from communities across Nepal can visit and gain inspiration from new techniques for developing the resilience in their communities on their own. Whilst the model villages allowed farmers to discuss issues with other farmers who had already established new sustainable agricultural techniques. From visits to these villages' community members from Fulbari and Patalekhet could speak freely with their peers, other small scale farmers in Nepal, who were also experiencing similar issues with regards to climate change. These model villages therefore do not only act as a source of information for community members but also help build a regional and/or national

sense of community amongst farmers in Nepal. If the local actors and/or authorities in the Trøndelag county were able to establish similar knowledge sharing centres, like those in Nepal, then they could easily provide community members with practical information. It is likely that the establishment of such knowledge parks in Norway would reduce the number of respondents stating that they receive insufficient specific information regarding climate change in their area. Furthermore, as in Nepal, knowledge parks could also boost the local initiative to independently undertake projects or activities which strengthen community resilience towards climate change as well as making rural communities less reliant on government reassurances and private insurance companies.

Due to the nature of the differences in the social construct of the rural communities in Nepal compared with Norway it may be difficult to apply some of the driving factors of the strong sense of community felt in Byneset and Rissa to Fulbari. Fulbari has a more complex social make up with greater divisions between caste and gender within the community than compared with the two Norwegian communities and therefore the shared culture experienced by individuals in Byneset and Rissa may not apply to Fulbari. However, Fulbari may be able to improve its sense of community through the creation of a community brand or dairy farmers union. If the community can manage to brand its community milk collection and sell this to the markets in Kathmandu stating the source location of the milk this may create a sense of unity in the Fulbari community which is similar to that of the farmers in Byneset and Rissa. Similarly establishing a dairy farmers union, like the Norsk Bonde- og Småbrukarlag in Rissa and Byneset, in Fulbari may lead to higher levels of community participation and cooperation, which could further improve the sense of community and therefore strengthen the community resilience in Fulbari.

Whilst respondents from both the Norwegian communities stated that they were content with the financial support from private insurers, they stated that it was one of their major expenses. Perhaps the local community members can follow Simons lead and sell some of their unnecessary machinery and ask their neighbours for support through the sharing of machinery instead. This could reduce the overheads for farmers in these communities and also perhaps

increase the sense of community. What was highlighted in all four of the case communities was the high level of support available from community members towards other community members. In all four communities there was a sense that if someone was in need of assistance they would always be able to find it from within the community. In the future, any projects that looks to build resilience towards the impacts of climate change in these areas should build upon this sense of support and togetherness which exudes from these communities.

6 Conclusion

The concluded thesis set out to assess the strengths and limitations of four rural communities, two in Nepal and two in Norway, towards hazards related to climate change. This study focused on how smaller communities, like the rural communities selected for this thesis, can prepare for future hazards related to climate change on their own by enhancing their community resilience. This thesis examined how three social dimensions of community resilience; social capital, community capacity, and information & communication influenced the strengths and limitations of the community resilience present in the four communities, Fulbari (Nepal), Patalekhet (Nepal), Rissa (Norway), & Byneset (Norway). These strengths and limitations were identified and assessed by this thesis through the use of empirical data collected using a mixture of qualitative interviewing techniques.

The analysis of the data collected during these interviews revealed many interesting findings about all four of the selected case communities. Firstly, it is evident from the findings (table 19) that the strengths of the community resilience in all four communities outweigh the limitations meaning that the four communities are fairly ready to handle future climatic changes in their area. However, the findings also shows that the limitations are higher in the two Nepalese communities than in the two Norwegian communities. Therefore, a major conclusion is that the two communities in Norway are currently better prepared for handling the future impacts of climate change than the two Nepalese communities. Nonetheless, the findings of this study suggest that there is still more that all four of the communities could do to improve their levels of community resilience towards climate change.

The analysis of the communities suggests that the communities of Rissa, Byneset, and Fulbari could strengthen their sense of community and the amount of information shared between local actors and community members, as well as between community members themselves by establishing active local groups which focus on issue specific to their communities, as seen in the local groups in the Patalekhet community. Furthermore, it was suggested at local actors like the

Village Development Committee in Fulbari and the local municipality in Rissa and Byneset could do more to incorporate the community members into the decision making processes, regarding future resilience building projects in their area, thus increasing the sense of attachment, sense of community, and information regarding climate related issues and practices shared in these communities.

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Appendix

Appendix – A

Interview guide for local community members in Nepal.

Introduction questions and gaining background information on the individual.

1. Name, age, occupation, (cast?)
   - Size of family
   - Does the family have a migrant sending money?
   - Do they have any kind of insurance?
   - Do they own their own land or rent?
2. How long have you lived in Kavre/Fulbari?
3. Have you experienced any hazardous events in your time in Kavre/Fulbari? (Earthquakes, floods, droughts, heatwaves, forest fires, crop failures)
   - If so how many roughly how many events have you experienced during your time in Kavre/Fulbari?
4. To what extent has a disaster affected you or your property?
   - How were you affected (what were the damages)?
5. Have you experienced any lasting damage after an event?

Questions regarding their feelings of the community and their community engagement.

6. Do you have contact with your neighbours?
   - Have you ever asked your neighbours for help or have your neighbours ever asked you for help after a hazardous event?
   - If so what type of help was asked for?
7. Does your community have any events or local groups which share information about potential hazards?
   - If so which groups? And are you a member of any of these groups or participate in any events?
8. Where/ how do you normally receive your information? Through mobile phones, verbal communication with neighbours, internet?
   - Does the community have access to 3g and if so has this had any impact on the way that you receive information?
   - Do you use technology to check the weather forecasts or use this new 3g technology in any other way?

Questions regarding their feelings of the local authorities and their engagement with the community.

9. Do you know of any work done by local authorities or NGO's which help to build resilience against future hazardous events? If work has been carried out:
   - Which work has been done?
   - How did you find out about this work?
   - Do you feel that those in charge of carrying out this work involved the local community enough?
   - (If multiple projects have been carried out in the community) which action do you think has worked the best in connection to these risks? And why?
10. Do you have any way to communicate with the local authorities, municipality or NGO's which may be able to help prevent or recover from a hazardous event?
11. Do you feel that the municipality has informed you sufficiently of the risks your community faces?
12. Have they provided you with any information which you and your community can do to mitigate these risks?

Additional and final questions.

13. Do you think that there is anything your community is missing to help either before or after a hazardous event?
    - Community level
    - Local authority/ NGO level
14. Have you/ or anyone you know relocated from the community to elsewhere due to the threats posed by hazardous events?
    - Are you considering relocating from your community in the future to avoid these risks?

Appendix – B

Interview guide for local community members in Norway.

Section 1: Introductory Questions
Seksjon 1: Innledende Spørsmål

Questions **Spørsmål**
Name? / **Navn?**
Age? / **Alder?**
Sex? / **Kjønn?**
Occupation? / **Yrke?**
Number of members in your family? / **Antall familiemedlemmer?**
Does your household have a family member who has migrated and sends money home? / **Har du et medlem av kjernefamilien som har migrert og sender hjem penger?**
Do you have any kind of insurance, if so which and why? (Home, vehicle, crop etc.) / **Har du noen form for forsikring, hvis ja, hvilken og hvorfor?**
(If you are a farmer) Do you own or rent your farm land and roughly how many acreages of land? / **(Hvis du er en bonde) Eier du eller leier du jorda, og ca hvor mange mål?**

(If you are a farmer) What do you use your land for? For example, crop farming (if so which crops and how many acreages do you use), dairy farming (if so, how many cows) etc. /

(Hvis du er en bonde) Hva bruker du jorda til? For eksempel, avlinger (hvis ja hvilken type og hvor stort areal), melkekuer (hvis ja, hvor mange kuer) etc.

If you are not a farmer could you give a brief description of your work and if it has any specific benefits to your community? /

Hvis du ikke er en bonde, kunne du gitt en kort beskrivelse av ditt yrke og om det har noen spesifikke fordeler for ditt lokalsamfunn?

How long have you lived in your community? Were you born in your community or did you move there, if so why? /

Hvor lenge har du bodd i ditt lokalsamfunn? Ble du født i ditt lokalsamfunn eller flyttet du dit, hvis ja hvorfor?

Questions
Spørsmål

Have you experienced any environmental hazardous events during your time in your community (floods, droughts, heatwaves, forest fires, crop failures etc.)? /

Har du opplevd noen form for miljøkatastrofer i løpet av din tid i ditt lokalsamfunn (flom, skogbranner, tørke, dårlige avlinger?

If so, can you describe the environmental hazardous events you have experienced giving as many examples as you can recall? /

Hvis ja, kan du beskrive miljøkatastrofene du har opplevd, ved å gi så mange eksempler som du kan huske?

To what extent has a disaster affected you, your property and/or your livelihood? /

I hvilken grad har en miljøkatastrofe påvirket deg, din eiendom og/eller ditt levebrød?

Section 2: Community Questions
Seksjon 2: Spørsmål til Samfunn

Questions
Spørsmål

What does the term "Community" mean to you? / **Hva er lokalsamfunnet for deg?**
Who would you say that you include in your community? Do you include family members, those living in your nearby geographical area, and individuals you regularly interact with from outside your geographical area in your idea of community? / **Hvem vil du si er en del av ditt lokalsamfunn? Inkluderer du familiemedlemmer, de som bor nærme deg geografisk, og individer du regelmessig samhandler med**
Do you believe that there is a community of Sør-Trondelag farmers or farmers as a whole in Norway which can support each other from future political, economic and/ or environmental threats? / **Finnes det et samfunn/organisasjon av sør-trønderske eller norske bønder som kan støtte hverandre ved fremtidige politiske, økonomiske og/eller miljøtrusler?**

Questions
Spørsmål

How much contact do you have with your neighbours? Do you regularly communicate with them and if so, how do you normally communicate with them? Do you prefer face-to-face communication or communication over the phone or social media for instance? / **Hvor mye kontakt har du med dine naboer? Har du gjevnlig kontakt med dem og hvis ja, hvordan kommuniserer du normalt sett med dem? Foretrekker du kommunikasjon ansikt til ansikt eller kommunikasjon over telefon eller gjennom sosiale medier for eksempel?**

Have you ever asked or been asked by your neighbours for assistance with farm work? /

Har du noen gang spurt eller blitt spurt av dine naboer om assistanse når det gjelder gårdsarbeid?

Have you ever asked or been asked by your neighbours for assistance after an environment hazard? /

Har du noen gang spurt eller blitt spurt av dine naboer om assistanse etter en miljøkatastrofe?

If so what type of help was asked for? /

Hvis ja, hva slags hjelp ble det spurt om?

Does your community have any events or local groups which you know of that share information about potential environmental hazards? /

Har ditt lokalsamfunn noen slags arrangementer eller lokale grupper som deler informasjon om potensielle miljøkatastrofer?

If so which groups? And are you a member of any of these groups or do you participate in any of these events? /

Hvis ja hvilke lokale grupper? Og er du medlem av noen av disse gruppene, eller deltar du på noen av disse arrangementene?

Where/ how do you normally receive information regarding potential environmental hazards? Do you receive information via a combination of internet, social media, face-to-face communication, and participating in groups and events? Or do you favour one source of information over others? /

Hvor/hvordan mottar du normal sett informasjon om potensielle miljøkatastrofer? Mottar du informasjon via en kombinasjon av internett, sosiale medier, ansikt til ansikt kommunikasjon og deltakelse i grupper/arrangementer? Eller foretrekker du en informasjonskilde over andre?

Does the area that you live in have access to 3g or 4g service and if so, has this had any impact on the way that you receive information? /

Har området du bor I tilgang til mobildata på telefonen(3g/4g)?

Do you use technology to check weather forecasts regularly? / **Bruker du regelmessig teknologi for å sjekke værmeldingen?**

Section 3: Local Authority Questions
Seksjon 3: Spørsmål til Lokale Myndigheter

Questions
Spørsmål

Are you aware of any work which has been carried out to help build resilience in your community to future hazardous events by local authorities (such as by the municipality) or local actors/organisations (such as the Bondelag)? / **Vet du om det har blitt gjennomført tiltak av lokale myndigheter for å øke ditt lokalsamfunns motstandskraft mot potensielle fremtidige miljøkatastrofer?**
If so, please state which work has been carried out and by whom. / **Hvis ja, kan du spesifisere hva slags tiltak som har blitt gjort, og av hvem.**
How were you made aware of this work being done in your community? / **Hvordan fikk du vite om eventuelle tiltak som har blitt gjennomført?**
Do you feel that you and your community has been well enough involved and informed about the work that has been carried out? / **Føler du at du og ditt lokalsamfunn har blitt bra nok involvert og informert om tiltakene some har blitt gjort?**
Do you believe that these projects have benefited your community in any way? Why do you have this belief? / **Tror du at disse tiltakene har vært til nytte for ditt lokalsamfunn på noen måte? Hvorfor?**

(If multiple projects have been carried out in your community) which action do you believe had worked the best in connection to these risks and why? /

(Hvis det har blitt gjennomført flere tiltak I ditt lokalsamfunn) hvilket tiltak tror du har vært det mest effektive for å øke motstandskraften mot miljøkarastrofer og hvorfor?

Do you have any way to contact local authorities or local actors (Such as the municipality or the bondelag) which may be able to help prevent or recover from an environmentally hazardous event? /

Finnes det en måte for deg å kontakte lokale myndigheter eller aktører (som f.eks kommunen eller bondelaget) som kanskje kan hjelpe med å forebygge eller å komme seg etter en miljøkatastrofe?

Have the local authorities informed you and your community sufficiently of the future risks climate change poses to your community? /

Har lokale myndigheter informert deg og ditt lokalsamfunn godt nok om den fremtidige faren klimaendringer påfører ditt lokalsamfunn?

Have the local authorities or local actors provided you with any information which you and your community can do to mitigate these risks? /

Har lokale myndigheter eller aktører gitt deg informasjon om hvordan du og ditt lokalsamfunn kan gjøre til å redusere denne faren?

Section 4: Final Questions
Seksjon 4: Avsluttende Spørsmål

Questions
Spørsmål

Do you believe that there is anything missing from your community that could help before or after a hazardous event which could be carried out at a *community level*? I.e. projects carried out by yourself, your neighbours, or local farming groups in your area. /

Tror du at det er noe som mangler I ditt lokalsamfunn som kunne hjelpe før eller etter en miljøkatastrofe, som kunne blitt gjennomført på et *lokalt nivå*? F.eks tiltak utført av deg selv, dine naboer, eller lokale bondegrupper.

Do you believe that there is anything missing from your community that could help before or after a hazardous event which could be carried out at a *local authority or local actor level*? I.e. by the municipality or organisations such as the Bondelag. /

Tror du at det er noe som mangler I ditt lokalsamfunn som kunne hjelpe før eller etter en miljøkatastrofe, som kunne blitt gjennomført på et *kommunalt nivå*? F.eks av lokale politikere, lokale aktører

Have you or anyone that you know relocated away from the community due to the threats environmental hazards pose on for future livelihoods? /

Har du eller noen du kjenner flyttet vekk fra ditt lokalsamfunn på grunn av at levebrødet trues av miljøkatastrofer?

Have you or anyone that you know considered relocating out of your community in the future to avoid potential future risks related to environmental hazards? /

Har du eller noen du kjenner vurdert å flytte vekk fra ditt lokalsamfunn en gang i fremtiden for å unngå potensielle farer forbundet med miljøkatastrofere?

Appendix – C

Assigned monikers for the research participants in Byneset and Rissa as well as some notable features.

Assigned moniker for respondents	Notable features
Oda	37, Female, Byneset resident, Farmer and veterinarian
Eirin	46, Female, Byneset resident, Farmer
Lena	30, Female Byneset resident GIS advisor, wildlife preserver, and farmer
Frida	44, Female, Rissa resident, Dairy and fodder farmer
Idunn	54, Female, Rissa resident, Property and contingency manager
Hans	56, Male, Rissa resident,

	Organic dairy farmer who also owns his own small business selling, among other things, homemade beer and ice cream
Simon	50, Male, Rissa resident, Goose and dairy farmer
Sigurd	47, Male, Rissa resident, Organic and conventional grain and dairy farmer

Appendix – D

Assigned monikers for the research participants in Fulbari and Patalekhet as well as some notable features.

Assigned moniker for respondents	Notable features
Maheshwor	31, Male, Fulbari, Brahmin
Fulmaya	63, Female, Fulbari, Tamang
Cheta	46, Male, Fulbari, Dalit
Sudarshan	53, Male. Fulbari, Brahmin
Kamala	35, Female, Fulbari, Brahmin
Batuli	43, Female, Fulbari, Dalit

Jamuna	40, Female, Fulbari, Brahmin
Indra	52, Male, Fulbari, Brahmin
Nirmala	31, Female, Patalekhet, Brahmin
Ramesh	25, Male, Patalekhet, Brahmin
Home-Kumari	53, Female, Patalekhet, Brahmin
Ganesh	60, Male, Patalekhet, Brahmin

Appendix – E

World averages for the various indicators of human development.

DEVELOPMENT LEVEL STATUS	HUMAN DEVELOPMENT INDEX (HDI)
Very high human development	0.894
High human development	0.757
Medium human development	0.645
Low human development	0.504

(UNDP, 2018)

REGIONS	HUMAN DEVELOPMENT INDEX (HDI)
Europe and Central Asia	0.771
Latin America and the Caribbean	0.758
East Asia and the Pacific	0.733
Arab States	0.699
South Asia	0.638
Sub-Saharan Africa	0.537

(UNDP, 2018)

WORLD AVERAGES	HUMAN DEVELOPMENT INDEX (HDI)
OECD*	0.895
World	0.728
Developing Countries	0.681
Least Developed Countries	0.524

(UNDP, 2018)

*Organisation for Economic Co-operation and Development

The World Bank Country Income Status

THRESHOLD	GNI/CAPITA (CURRENT US$)
High-Income	> 12,055
Upper-Middle Income	3,896 – 12,055
Lower-Middle Income	996 – 3,895
Low-Income	< 995

(World Bank, 2018b)

Appendix – F

Hans and his ice cream equipment, which was partially funded by Innovasjon Norge.

Appendix - G

Milk collection centre in Fulbari.

An image of the community milk collection centre, metal shed to the right of the image, from the outside and is connected to a local store, centre of image, which sells necessities for the community.

Inside the community milk collection centre, with 20 litre milk jugs on the floor and milk collection tank in the centre.

Appendix – H

Biogas plants outside the homes of certain community members in Fulbari.

Photograph of the outside of the biogas plant with the plaque stating the supporting parties involved.

Gas valve which releases the gas into the home containers which is then used for cooking.

Manure churner which processes the manure and helps produce the biogas.

David Ellis Johnson

NTNU
Kunnskap for en bedre verden