SOCIAL VULNERABILITY TO LANDSLIDE RISK: A CASE STUDY OF LOCAL COMMUNITIES IN THE MID-WESTERN DEVELOPMENT REGION, NEPAL

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Preface and Acknowledgements

As a Master student International Development Studies at Wageningen University and Research, I became interested in issues concerning climate change and disaster governance in underdeveloped parts of the world. Since I had already become acquainted with Nepal through earlier travels, and had become to liken the country and its people, I decided to choose Nepal as the focus country of my Msc. research.

The challenges concerning landslide risk that communities in the Mid-Western Development Region of Nepal are facing are big, and will continue to grow given the increase in the adverse effects of both climate change, as well as the rise in 'development projects', for instance in the form of poorly managed road construction. I hope this research will be useful to determine more specifically what these challenges are and how they can be faced, both by the academic community as well as (local) legislators or other types of stakeholders that seek to develop policies to tackle these problems.

I would to thank Dr. Art Dewulf, for his support and helpful feedback, both during my fieldwork, but also while writing my proposal and preparing for the fieldwork. Second, I would like to thank the employees of various NGO's that helped me during my fieldwork in Nepal. In Kathmandu, this was the crew of the NGO Practical Action, especially Sumit Dugar, who helped me enormously in getting in contact with the right parties to plan a successful fieldtrip to some of the districts within the Mid-Western Development Region. Thank you Ramesh Shresta of the NGO Mission East for hosting me in the beautiful Mugu district and taking me along on your fieldtrip, enabling me to visit the most secluded parts of the district in a safe way and with great company. Last and certainly not least, I would like to thank the staff of the NGO KIRDARC in the Surkhet, Mugu, and Jumla district, who every single time have helped me determine which local communities could be of interest to me and arranging transport to these communities. Especially I would like to thank Sunitha Thapa, who came with me on almost all of my fieldtrips in the Surkhet district and served as my translator for all interviews. Thank you for making me feel welcome in Surkhet and accompanying me to the most interesting research sites in the district.

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1. Introduction

Nepal is one of the most vulnerable countries in the world to disaster. A wide variety of natural hazards occurs on a yearly basis, which makes Nepal a country of high vulnerability (Aryal, 2012; UNDP report, 2001; BCPR report, 2004; MoHA report, 2005). Over the past two decades, ecological hazards and the resulting disasters have increased in intensity and frequency (Ibid.). Increased warming of the earth is causing widespread mass losses of glaciers and reductions in snow covers, leading to an increase in landslide risk in mountainous areas such as Nepal's Himalaya region (Manandhar et al., 2012; Petley et al., 2007). The Himalayas stretch 2,500 km from Pakistan to Myanmar, and cover half of Nepal's landmass. Mountainous areas like the Himalayas play a paradoxical role in development processes concerning disaster vulnerability. On the one hand, these areas constitute an exceptionally diverse cultural and natural heritage and play a central role in creating balance in the planet's ecosystems (Khalid & Kaushik, 2008). On the other hand, in spite of their ecological importance, these regions and the people that populate them tend to be more marginalized in comparison to areas that are easier to reach from and closer to urban areas. They have to deal with slow economic development and environmental degradation. Because of their geographic characteristics, they tend to be relatively understudied and underrepresented in development agendas and governance.

Nepal's Mid-Western Development region (henceforth: MWR) is a good example of a high-risk mountainous area that is coping with environmental hazards. It is one of the areas in Nepal that is most prone to fatal landslides (UNFCO, 2011). In spite of this, little research has been done with respect to the social processes and practices that aim to reduce the impacts of disasters such as landslides on the livelihoods of people in this region. Questions concerning the formulation of policies for reducing the risk of landslides, or the role of different stakeholders that can aid affected populations in adapting to the risks of potential landslides, are relatively understudied. This study wishes to fill up a part of the knowledge gap that currently exists concerning these type of questions.

Landslides involve the movement of material that varies considerably in its character; it can be rock, debris, mud, soil, or even a combination of several of these (Alexander, 1989: p. 157; Blaikie, 2004). Landslides can be generated by a wide variety of determinants. These can be human induced, in the case of unmanaged road works (Smith, 1992: p.165) or deforestation (Alexander, 1989; NSDRM Nepal, 2008), or the consequence of bigger natural disasters like earthquakes or flooding (ibid.). According to several authors, in applying a vulnerability analysis that focusses on the socioeconomic and institutional factors of vulnerability, it is important to move beyond the physical hazard to inquire

about human activities that might act as 'triggers' of the physical event, but also as the manner in which people are exposed to the risk of the landslide according to their local characteristics (Blaikie, 2004: p. 182; NSDRM Nepal, 2008). This study's aim is to assess the social vulnerability of a number of local communities in the MWR to landslides. That is why this research has employed an analysis that focusses on socioeconomic and factors of vulnerability and the institutional context that shapes these, using a political economy approach to assess the overall social vulnerability of several communities to landslides.

This will be done by assessing both the individual and collective vulnerability of local communities, and the institutional adaptation that determines and links these two aspects of social vulnerability in each case study. The main research question is:

What is the social vulnerability of local communities in the MWR to the impact of landslides, considering their individual and collective vulnerability, and the institutional adaptation of formal and informal insitutions?

This main question will be answered by investigating two sub-questions. The first question will focus on the assessment of individual and collective vulnerability of internal stakeholders of local communities in the MWR, and The second sub-question will investigate which DRR strategies are employed by external stakeholders. This results in the following two sub-questions:

Which resources are needed to adapt to landslides and how are these resources distributed by internal stakeholders of local communities in the MWR?

How does institutional adaptation of external stakeholders affect the vulnerability of local communities in the MWR?

To summarize, there are two main problems that this research is trying to address. First of all, relatively little is known about the social vulnerability to landslides of local communities in the Mid-Western Development region. As mentioned, literature on the topic of social vulnerability suggests that external stakeholders in the form of formal and informal institutions are for a considerable part contributing to the degree of vulnerability to landslides, by exacerbating or ameliorating localized forms of adaptation to the impact of landslides on local livelihoods. (Blaikie, 2004: p. 182; NSDRM Nepal, 2008; Petley et al., 2007; Devkota, 2014; Regmi et al. 2014; Oven 2009). The approach that we develop places the social and economic well-being of society at the centre of the analysis, focussing on the socio-economic

and institutional constraints that limit the capacity to respond. From this perspective, the vulnerability or security of any group is determined by resource availability and by the entitlement of individuals and groups to call on these resource. This research aims to create a better understanding of the distribution of resources that are needed to adapt to landslides.

This document further consists of the Conceptual Framework (Chapter 2), Methodology (Chapter 3), Results and Analysis (Chapter 4), Discussion (Chapter 5), and Conclusion (Chapter 6).

2. Conceptual framework

The concept of vulnerability is often conceptualized in very different ways, depending on the knowledge domain it is being studied in. For instance, natural scientists tend to use the term in a more descriptive manner, whereas social scientists often place the term in a more explanatory context (O'Brien et al. 2004; Gow, 2005). This often results in the distinction between biophysical (or natural) vulnerability and socioeconomic (or social) vulnerability (Füssel, 2007). There is no universal theory or model of vulnerability, and the definition of the concept highly depends on the aim and needs of the research it is being used in (Ibid.).

Different conceptual frameworks provide a variety of factors that are to determine the vulnerability of a system to a specific hazard. Often, these different terminologies are incompatible with one another or are not comprehensive enough to integrate with one another. According to Füssel (2007), the main reason for this confusion is the failure to distinguish between two independent dimensions of vulnerability factors: *scale* and *knowledge domain*.

2.1 Two dimensions of vulnerability: scale and knowledge domain

When using the dimension of *scale, v*arious authors distinguish between the 'external' and 'internal' side of a system's vulnerability to environmental hazards (Ellis, 2000; Sanchez-Rodriguez, 2002; Turner et al., 2003). These terms are used to distinguish the external factors that a system is exposed to from the internal factors that determine their impacts on that system. Internal vulnerability factors refer to properties of the vulnerable system or community itself, whereas external vulnerability factors refer to something outside the vulnerable system. This distinction typically reflects geographical boundaries or the power to influence. The designation of a specific factor as internal or external may depend on the scope of the vulnerability assessment. For instance, national policies would be regarded as internal in a national assessment but as (largely) external in a local assessment (Füssel, 2007).

The dimension of *knowledge domain* makes a divide between socioeconomic and biophysical vulnerability factors. Examples of socioeconomic factors are factors that relate to economic resources, the distribution of power, social institutions, cultural practices, and other characteristics of social groups typically investigated by the social sciences and the humanities. Biophysical vulnerability factors, in contrast, are related to system properties investigated by the physical sciences. These two categories can overlap, for instance in the case of built infrastructure (Ibid.). Table 1 presents a classification scheme of vulnerability factors. By classifying vulnerability factors in this manner, it becomes possible to link different types of vulnerability factors to each other in a clear and meaningful way.

Table 1

	Knowledge Domain	
Scale	*Socioeconomic*	*Biophysical*
Internal	Social networks, access to recources	Soil condition, local rainfall patterns
External	National policies, insitutional adaptation	Earthquakes, global climate change

Before going deeper into the different approaches to operationalize vulnerability, a more elaborate definition of the concept of social vulnerability and its different interpretations is needed.

2.2 Vulnerability: one word, two interpretations

The past decades, the concept of vulnerability has gained more importance in the field of climate change research, with both natural and social scientists eager to measure and assess vulnerability. Lead by the assessment reports carried out by the Intergovernmental Panel on Climate Change (IPCC), a broad framework of vulnerability research has been created, in which the notion of vulnerability has grown to contain notions of risk, impacts, and adaptability (O'Brien et al., 2004). But the extensive use of vulnerability in the climate change literature hides two very different interpretations, that can also be linked to the beforementioned divide into the socioeconomic and biophysical knowledge domains.

On the one hand, there is the more traditional interpretation of vulnerability, which often is referred to as the *end point* interpretation of an analysis: "assessment of vulnerability is the end point of a sequence of analyses beginning with projections of future emission trends, moving on to the development of climate scenarios, thence the biophysical impact studies and the identification of adaptive options" (Kelly & Adger, 2000, p. 326). In such an analysis, any residual consequences that remain after adaptation has taken place, define the levels of vulnerability. So within this interpretation,

vulnerability summarizes the net impact of the climate problem, and can be represented quantitively as a monetary cost, or a change in human mortality or ecosystem damage, or qualitatively as a description of relative or comparative change (O'Brien et al., 2004). The end point approach to vulnerability originates from research that focusses mainly on biophysical vulnerability, whereby the most vulnerable are considered to be those living in precarious physical environments (Liverman, 2001).

The second interpretation of vulnerability considers vulnerability as a *starting point* for analysis. Instead of being defined by future climate change scenarios and anticipated adaptations, vulnerability "(…) represents a present inability to cope with external pressures or changes, in this case changing climate conditions. Here, vulnerability is considered a characteristic of social and ecological systems that is generated by multiple factors and processes" (Ibid.: p. 2). This focus on prior damage, also referred to by Kelly & Adger (2000) as the "wounded soldier approach", assumes that addressing present-day vulnerability will ultimately reduce vulnerability under future climate conditions (Burton et al., 2002). One of the purposes of a vulnerability assessment that uses a starting point interpretation of vulnerability, is to identify policies or measures to reduce vulnerability, increase adaptive capacity, or illuminate adaptation options and constraints (O'Brien et al., 2004). The starting point interpretation has its origins in assessment of social vulnerability with the purpose of identifying the character, distribution and causes of vulnerability. From this perspective, case studies can be used to provide an understanding of the underlying causes and structures that shape vulnerability (O'Brien et al, 2004).

The way vulnerability is interpreted has consequences for how climate research is carried out within interdisciplinary research institutes, but it also has major implications for how the issue of climate change and its effects in the form of potential hazards is being addressed by policy makers.

2.3 Defining social vulnerability

This research adopts a definition of vulnerability that uses the starting point interpretation of this concept. This leads to a more constructionist definition of vulnerability, defining vulnerability through its social context, and placing the social wellbeing of society at the centre of analysis, focussing on who is most vulnerable and why. It implies that this research adapts an approach that concentrates attention on the socio-economic and institutional context within which the impact process of landslides takes place. For instance, Blaikie et al. (1994) separate the biophysical and the social dimensions, by defining vulnerability in terms of human dimension alone: "[Vulnerability entails] the capacity to anticipate, cope with, resist and recover from the impact of a natural hazard" (Blaikie et al., 1994: p. 2). The biophysical component, or any exposure to the hazard is left outside their definition of the concept of vulnerability. Still, it is intrinsic to the definition that vulnerability must always be

linked to a specific hazard, so vulnerability and exposure do remain inseparable (Ibid.).

Relating to this approach, this research defines vulnerability as: *"the ability or inability of individuals and social groupings to respond to, in the sense of cope with, recover from or adapt to, any external stress placed on their livelihoods and wellbeing. (…) It is determined by the availability of resources and, crucially, by the entitlement of individuals and groups to call on these resources*" (Adger & Kelly, 1999: p. 328). By adopting this definition used by Adger & Kelly (1999), this research puts emphasis on the assessment of vulnerability to short-term climate hazard (landslides in this case), as it is these events that populations first and foremost experience and react to.

By adopting this definition, vulnerability is understood as a dynamic entity, that is in a continuous 'state of flux' as the biophysical and social processes that shape local conditions and ability to cope also change (O'Brien et al., 2004; Handmer et al. 1999). Because vulnerability is defined in terms of the ability or inability of individuals and social groupings to respond to any external stress placed on their livelihoods and well-being, an analysis of this type will also provide a starting point for the determination of effective means of promoting remedial action to limit impacts by supporting coping strategies and facilitating adaptation (Kelly & Adger, 2000). It is important to emphasize that by viewing vulnerability as a starting point of analysis, a causal direction between vulnerability and adaptation is implied, namely that vulnerability determines adaptive capacity and hence adaptations (O'Brien, 2004).

2.4 Defining adaptive capacity and vulnerability

Like vulnerability, adaptive capacity is a concept that has come to have several interpretations and nuances in the climate change literature. As with the concept of vulnerability, adaptive capacity also can be interpreted in two ways that are closely linked to the end-point and starting point interpretation of vulnerability: "In the end-point interpretation, adaptive capacity has been used as a measure of whether technological climate change adaptations can be successfully adopted or implemented. In the starting-point interpretation, adaptive capacity refers to the present ability to cope with and respond to stressors and secure livelihoods" (O'Brien, 2004: p. 4).

These different understandings of adaptive capacity are related to interpretations of adaptation. Burton et al. (2002) point out that the term adaptation also has several interpretations, which can be roughly divided into "first generation" and "second generation" adaptation research. This first generation of adaptation research is impacts-driven and oriented towards mitigation policies, where mitigation can be understood as "(…) the prevention of dangerous interference with the climate system by the stabilisation of greenhouse gas concentrations in the atmosphere" (Burton et al., 2002:

p. 146). Concerning this, Burton notes: “What matters in this connection is the extent to which the gross impact of climate change can be reduced by adaptation. (…) By implication, the greater the impacts the more need for mitigation. Furthermore, the greater the effectiveness of adaptation in reducing vulnerability to climate change, the less will be the urgency to reduce greenhouse gasses” (Burton et al., 2002: p. 147). This approach relies on future scenarios and future impacts of climate change rather than towards present vulnerability (O’Brien et al, 2004). In contrast to this, the second generation of adaptation research “(…) considers adaptations in response to a wide variety of economic, social, political and environmental circumstances. The point of departure is the present, in terms of the distribution of vulnerability, existing adaptation to the climatic environment, and the way that current policies and development practice serve to reduce or exacerbate vulnerability.” (O’Brien, 2004: p. 4). Future climatic and socio-economic adaptations are taken into account when assessing and prioritizing policy options, but only to set the context for future adaptations. Burton et al. (2002) note that these identified adaptation options should ideally be incorporated into a wide range of policies (for example, agricultural, public health and development policies), rather than one separate climate policy. Because these two interpretations entail radically different “diagnoses” of a problem, they also have different “cures” for it. The end point interpretation diagnoses climate change as the main problem. Cures entail greenhouse gas emissions reductions and the reduction of sensitivity of economic, social, and environmental systems to projected changes in particular climate parameters (O’Brien et al., 2004). On the other hand, the starting point approach diagnoses inherent social and economic processes of marginalization and inequalities as the causes of climate vulnerability and seeks to identify ways of addressing these (Ibid.). Vulnerability assessment that view vulnerability as a starting point can be used to identify adaptive capacity, which in turn provides insight into the opportunities and constraints to implementing specific adaptation policies (O’Brien et al., 2004; Burton et al., 2002). The type of policy measures include poverty reduction, diversification of livelihoods, and strengthening of collective action, and are social rather than technical in nature (Kelly & Adger, 2000).

2.5 The architecture of entitlements: setting a framework for analysis

Social systems react to climate change through adaptation. These reactions may be involuntary, spontaneous responses, or they may be deliberate adaptive strategies (Adger & Kelly, 1999; Smit et al., 1998). As the definition of social vulnerability by Adger & Kelly (1999) states, vulnerability is determined by the availability of resources and, crucially, by the entitlement of individuals and groups to call on these resources. This means that the basis for any examination of social vulnerability requires an understanding of the human use of resources: “The extent to which individuals, groups or

communities are 'entitled' to make use of resources determines the ability of that particular population to cope with and adapt to stress. (…) Examining social vulnerability to climate change through an entitlements approach means consideration of the availability and distribution of entitlements, the means by which entitlements are defined, contested and, therefore, change over time, and the wider political economy of the distribution and formation of entitlements" (Adger & Kelly, 1999: p. 256). So the term 'entitlements' can be used to define the material and social aspects of resource use within a specific socio-political system. In fact, the usage of this term in such a manner is based on a premise that the institutions of the state are dominant in determining access to resources. So the causes of vulnerability are fundamentally related to the social and institutional context of the community that is being observed (Adger, 1999). Adaptation is socially mediated and "(…) occurs through the actions of individuals facilitated or constrained by relevant institutions as well as through the action of institutions themselves. The extent to which action is constrained and the resources upon which adaptive measures can be based form the basis of the analysis of social vulnerability to climate variability and the architecture of entitlements, ranging from the situation of the individual to the social institutions of the wider political economy" (Adger & Kelly, 1999: p. 258).

Based on this framework, social vulnerability can be disaggregated into the two distinct aspects of *individual* and *collective* vulnerability in order to clarify the scale issue and the unit of analysis that already was mentioned in the beginning of this section (see Table 1 based on the framework provided by Füssel (2007). Individual vulnerability is determined by access to resources and the diversity of income sources, as well as by social status of individuals or households within a community, and can be observed by looking at the respondents' resource dependency and processes of social learning. Collective vulnerability (of a nation, region, or community) is determined by market and institutional structures, which can be observed through processes of institutional adaptation. Of course these two aspects of vulnerability are interlinked through social processes and institutional arrangements. This research translates both individual and collective vulnerability factors to the internal scale dimension, while the institutional context and process of adaptation can be observed through vulnerability factors in both the internal and external scale dimension.

Type of vulnerability	Causes in relation to climate extremes	Indicators of vulnerability
Individual vulnerability	Relative and absolute poverty; entitlement failure; resource dependency	Poverty indices; proportion of income dependent on risky resources; dependency and stability
Collective vulnerability	Absolute levels of infrastructure, development; institutional and political factors – insurance and formal and informal social security	GDP per capita; relative inequality; qualitative indicators of institutional arrangements

Table 2: collective and individual vulnerability to climate change: causes and indicators. Source: Adger, 2000: p. 252

It is important to understand both the level of vulnerability of a particular population, as well and the *factors* that determine that level of vulnerability: "the factors which determine levels of social vulnerability define how the pattern of access to resources is constructed; this construction can be termed the 'architecture of entitlements'" (Ibid.). Within this framework, assessment of social vulnerability is based on three pillars: 1) direct analysis of the material sources of entitlements, which is manifest at the *individual* level; 2) the distribution of those entitlements at the *community* (or population) level; 3) the institutional context within which the entitlements are formed, contested and distributed over time and among groups. An analysis of this institutional context using the concept of institutional adaptation links together the individual and collective aspects of social vulnerability (Ibid.).

2.5 Operationalizing social vulnerability using three indicators of vulnerability

This research has used the following three indicators of social vulnerability, that also link to these three different pillars of vulnerability assessment: 1) *resource dependency* as an indicator of individual vulnerability, 2) *Inequality* as an indicator of *collective* vulnerability, and 3) *Institutional adaptation* as an indicator of the overall social vulnerability, determining these two aspects and linking them together.

Resource dependency is an element of individual vulnerability (Adger, 1999; Machlis, Force and Burch, 1990). It is constituted by reliance on a narrow range of resources leading to social and economic stresses within livelihood systems. "Resource dependency relates to communities and individuals whose social order, livelihood and stability are a direct function of its resource production and localized economy" (Adger, 1999: p. 254). This dependency can be observed through a combination of reliance on climate dependent resources; variability in such income resources; and migration and other social variables (Ibid.; Ellis, 1998). So social vulnerability to climate extremes on the individual level involves a wide range of aspects of resource use dependency that define the need for access to resources and ultimately livelihood entitlements (Adger, 1999; Parson et al, 1995). A key issue in observing this indicator of vulnerability is that the dynamic nature of the phenomenon is difficult to capture using only qualitative methods, as this research does.

Second, inequality can be seen as an indicator of *collective* social vulnerability. At the collective level, social vulnerability is determined by the operation of formal and informal institutional coping mechanisms. Specifically, vulnerability to climate extremes is determined by the formal institutional arrangements which organize warning, planning and other services (Adger, 1999: p. 255). Increasing inequality over time within a population, or between different parts of the population,

increases collective vulnerability to climate change. Such changes in inequality are linked to the reduction of communal allocation of resources and the pooling of risk, and other social phenomena associated with the ``moral economy.'' In addition, inequality and vulnerability linkages are associated with relationships between inequality, diversification of income sources and poverty. In other words, inequality affects vulnerability directly through constraining the options of households and individuals when faced with external shock; and indirectly through its links to poverty and other factors."(Adger, 1999: p. 255) This research will focus solely on the direct link between inequality and vulnerability. The most important issue in vulnerability analysis is determining the causes of the observed inequality, thereby informing the nature of the collective vulnerability (Ibid.).

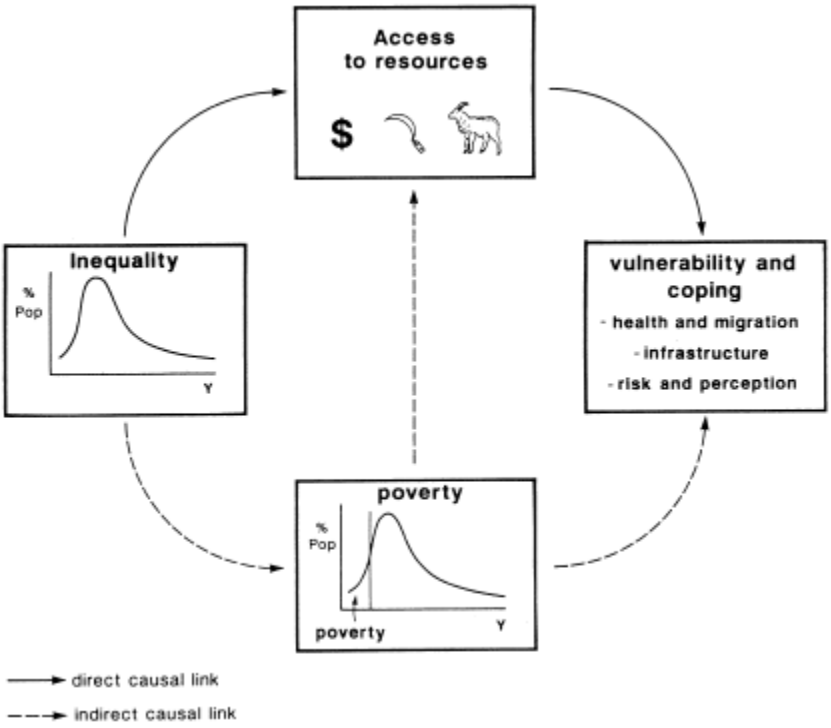

Figure 1: Direct and indirect links between inequality and vulnerability (collective vulnerability) Source: Adger (1999)

A third indicator of vulnerability in this context is institutional adaptation. As has been pointed out, a primary role of institutions is to enable society to adapt. The two previously discussed indicators of vulnerability are predicated by the influence of institutions on their operation, which means that the individual dependency on resources, the collective use of these recourses are all institutionally determined, and hence central to this type of analysis of social vulnerability (Adger & Kelly, 1999; Adger, 1999). Adaptation occurs through the actions of individuals facilitated or constrained by relevant institutions, as well as through the actions of insitutions themselves (Adger & Kelly, 1999). As Jordan & O'Rordian (1995) illustrate, institutions incorporate structures of political power and

legitimacy. This characteristic of institutions allows for examination of the change - in the form of adaptation – of the so called 'institutional architecture': "(…) structures of institutions and constraints on their evolution, and the constraints they exert on individuals" (Sanderson, 1994). According to Adger (1999), the most important aspect of the observation of institutional adaptation is the assessment of whether the change is *appropriate* for the 'external threat' of landslides. This 'appropriateness' can be examined by looking at the institutional response to external stress, and the way this institutional response is legitimized within the internal or external constituencies and stakeholders of the institutions. The issue of appropriateness of institutional adaptation is addressed in reference to how it affects the environment for the other indicators of vulnerability. Institutional *inertia* is examined as a means or strategy for policy institutions to retain their own power and objectives (Jordan & Greenaway, 1998). Thus, assessment of vulnerability, requires analysis of the political economy and examination of the structures of institutions, constraints on institutional adaptation and evolution and the constraints institutions exert on individuals (Sanderson, 1994).

3. Methodology

This research includes several case studies that asses the social vulnerability of local communities to landslides. All of these case studies are situated in the Surkhet, Jumla, and Mugu district. These districts are part of the Mid-Western Development region (MWR) of Nepal (figure 1). This is also the region of focus of this research. The Karnali region is part of the MWR. It has some of the most remote and economically depressed areas of the country, in particular the Mugu and Jumla districts. Little research has been done with respect to the social processes and practices that aim to reduce the risks of disasters such as landslides in this region, and much of the landslides and other disasters that occur in the Karnali region are also unreported. The MWR comprises 15 districts with Surkhet as regional headquarters, hosting the administrator's office.

The MWR region benefits from a diverse topography, climate, ecology and bio-diversity (ICIMOD-CBS-SNV, 2003; UNFCO, 2011). The lack of physical infrastructure in the Karnali Zone presents a major challenge to accessibility and service delivery. The only option is limited and unreliable air-flights. It is mainly through the help of the local NGO KIRDARC that I have gained access to the chosen research sites in this region. Also, KIRDARC has helped tremendously in providing accommodation in the visited areas.

The three districts – especially Jumla and Mugu - have been chosen because of their socio-economic position; they are part of the higher mountain ranges of the Karnali region and therefore represent landslide prone areas that have been understudied and marginalized when it comes to

Figure 2: Three visited districts and their location relative to the capital Kathmandu, using Google Earth (Google, 2017)

the reporting of the social context of landslide threat. The Mugu and Jumla district are part of the Karnali region, Surkhet district lies just outside what is geographically seen as the Karnali region. As already noted, Surkhet district is the regional headquarter of the Mid-Western Development region, hosting many NGO and governmental offices that are responsible for overseeing DRR policies in the entire MWR. Therefore it was chosen as one of the districts to do research in. In discussing the results, each of these districts will be used as a case study to structure the results and answer the sub questions of the research.

Surkhet is the regional headquarter of the Mid-Western Development district. The district is well connected to road networks and geographically it lies between the southern flat 'terrai' and the northern higher mountain ranges of the Karnali region. This district was selected for the research because important district governmental offices and NGO's are situated in its capital Birendranagar. The two village communities that have been visited were picked because either a VDC (Village Development Committee) office was located there, or because there was activity of a NGO in relation to landslide risk.

Figure 3: Surkhet district. Regional and District headquarter Birendranagar (A), Hariharpur (B), and Satakhani (C)

In the Mugu district, the district headquarter Gamgadhi and the village community of Kache were visited. Gamgadhi was also chosen because of the presence of NGO headquarters and the District offices of several governmental bodies. Kache is situated on a very isolated location, taking a 6 hour walk from Gamgadhi. It was chosen because of two reasons. Firstly, to see how a local NGO tried to set-up and implement strategies regarding landslide risk reduction in a socially isolated community. Secondly, to gather data on the occurrence of landslides in the proximity of the village and the possible adaptation strategies that are being used by the villagers.

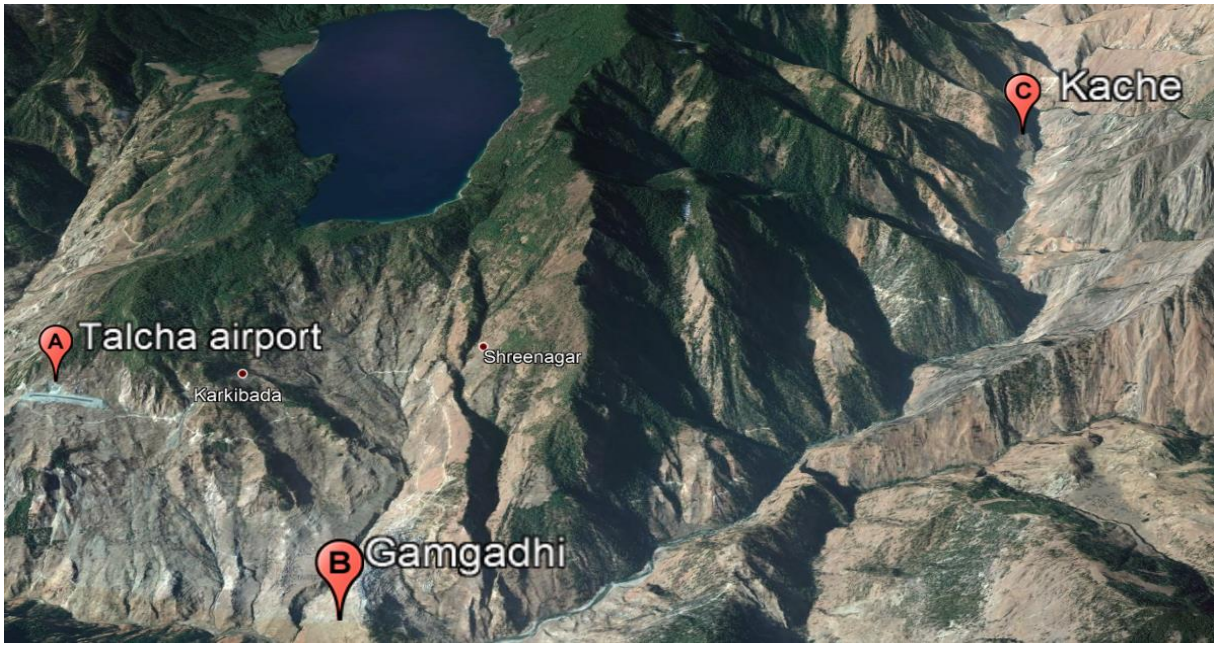

Figure 4: Mugu district. District headquarter and capital Gamgadhi (B) and village community Kache (C)

Last, in the Jumla district, the district capital Jumla and the village community Hanku were visited. The town of Jumla is also the district headquarter for several NGO offices and hosts the important

Figure 5: Jumla district. District capital Jumla (A) and village community Hanku (B)

governmental offices like the District Development Office. Hanku village suffered from a landslide on the same spot on a yearly basis, making it an interesting case study for this research.

The main method of data collection of the research was semi-structured interviews. Each interview was based upon a set of predetermined themes and concepts that related to the research questions and aims. The semi-structured interviews were open ended, but followed a general script and covered a list of topics, which were written down in an interview guide (Bernard, 2011). What topics the interview comprised of was contingent on the type of respondent that was being interviewed. No specific interview questions were used, mainly because of the broad scope of the research and the wish of the researcher to gather as much information about the topic the specific respondent had to offer. For instance, when interviewing the inhabitant of a local community that had experienced the effects of a landslide, the questions mainly were adapted according to the context of that specific interview, which means that questions about the perception and effects of the landslide are more likely to have been asked. The interviewee was allowed to bring up topics themselves, and if these topics would relate to the research aims, more would be asked about it. In this way, the data collected stayed as close to the social reality as possible, and tried to take the main concepts and theories underlying the research as an end point to interpret the data, rather than as a starting point. A total of 33 interviews were conducted with different types of respondents. The length of the interviews ranged from one hour long interviews with governmental or NGO stakeholders, to shorter interviews with NGO workers over a cup of coffee, that lasted half an hour. The interviews took place in Nepal during the months of February, March, and April 2017. Every respondent was informed about the research, its most important aims and what the data would be used for and that it would be treated confidentially. Also, all respondents gave verbal consent for the interviews to be used for the study.

The study population consisted of different types of respondents. The semi-structured interviews were conducted with *internal* and *external* stakeholders. This was done in order to cover the internal external divide of the concept of vulnerability while gathering data. This means that it was the scale (Local was *internal,* all other scales were *external)* that determined which respondents were labelled *external* and *internal* stakeholder. Internal stakeholders are representatives of local government bodies (like the Village Development Committee), local people that have experienced landslides in their locality or are living in a landslide prone site, and NGO workers that are working on the local village level. External stakeholders are representatives of governmental bodies (e.g. the District Development Office or the District Soil Conservation Office, etc.), academics who are studying landslides in Nepal, and NGO workers working at the district or national level.

The interviews in the Surkhet, Mugu, and Jumla district were mostly conducted with the aid of a local translator, who worked with the local NGO KIRDARC - in the case of Mugu and Surkhet - or at a local school as an English teacher - in the case of Jumla. None of the translators that helped during the fieldwork wanted money in exchange for their services and insisted that it was part of their job (in the case of the NGO workers) or that they just liked helping out with the research on their day off (in the case of the local English teacher). Most of the NGO workers that were interviewed at the District level were able to speak English, whereas at the local level both NGO workers and local inhabitants often replied in Nepali while the questions were in English.

As noted in section 2.2, this research adopts a constructionist definition of vulnerability, by looking at the social construction of vulnerability, focussing on what makes local communities vulnerable to landslides. This analytical principle was used during the process of data gathering as a guide to find the most important patterns, themes and inter-relationships concerning vulnerability and adaptive capacity of local communities to landslide risk. Because this study employs such an analytical concept to analyse observed data, no universal claim can be made about the nature of the phenomena that are described in this study. Rather, the results of this study have to be understood within the social context in which they were observed. This also means that the possibility of alternative conceptualisations of the same phenomena also needs to be underscored.

An inductive analysis was used to analyse the gathered data. In its idealized form, inductive research involves the search for patterns from observation and the development of explanatory theories for those patterns through a series of hypotheses (Bernard, 2011: p. 7). For example, in progressing with the fieldwork, it was noticed that internal stakeholders were mostly talking about the lack or the maldistribution of resources that enabled them to adapt to a landslide, and external stakeholders were mostly explaining or defending the lack of adaptation policy. This lead to the adaptation of interview questions that used these reoccurring themes, depending on the type of stakeholder that was interviewed. Also, by coding the 33 interviews, a number of reoccurring themes were determined and used. This eventually lead to the adaptation of the definition of vulnerability by Adger & Kelly (1999) (see section 2.3), and the further operationalisation of this concept (see section 2.5).

4. Results & Analysis

4.1 Surkhet District

4.1.1 Individual and Collective Vulnerability in Surkhet District – Internal Stakeholders

One and a half years ago, in 2016, a landslide hit Satakhani village. The impacts of the landslide on local livelihoods and the dependency and distribution of resources needed for adaptation are reported through interviews with three internal stakeholders. These stakeholders are the principal of the Satakhani high school, a local inhabitant who is a Red Cross volunteer, and the secretary of the Village Development Committee (VDC).

Among the victims of the Satakhani landslide were seven high school students. Sometime before the landslide occurred, an official from the district soil conservation office came to the community and warned them about the way the local people were collecting stones from the mountain slopes in order to build huts and houses (Interviewee 86). They were clearly not aware of the risk that the stone cutting was creating. Because the river runs close to the mountain slope, a landslide was likely to happen after a period of intensive rainfall. After warning them about the risk of collecting rocks, the villagers replied to the official that because they had been living at that spot for a long time, they could predict the possibility of a landslide. “And if it comes, it will come in a small amount, but will never affect our houses or our lives” (Interviewee 86). According to the secretary of the VDC, the impact on the community was aggravated by the flooding of the river on the other side of the settlement. Seventy three households were highly affected by the landslide, and twenty three were partially destroyed. Seventeen people lost their lives, of which only three bodies were found further up the river (Interviewee 81).

According to the VDC secretary of Satakhani, there is a general lack of awareness concerning adaptation strategies to landslide risk among the local people in Satakhani (Ibid.). In some cases, villagers questioned the planting of new trees to strengthen the soil on the hill slopes. The VDC secretary remarked that there is no one to take a lead in making the different political parties aware of the importance of awareness raising on the topic of landslide risk in the area. It is only the secretary himself that has to find solutions for this issue, which he finds very hard to do in combination with all the other tasks that are bestowed upon him (Ibid.). A second issue according to the VDC secretary is

the lack of government policy regarding risk management. He emphasises that the only thing this policy entails is providing the victims of landslides or floods with relief items and creating temporal camps in which the victims can be accommodated, which is not enough according to him. They are waiting for the government to do something about the way the people are living in the camps, and hopes that the local elections of the summer 2017 will bring some change in the accountability of local politicians (Ibid.).

Mandu Dawai is one of the survivors of the Satakhani landslide. He has moved to a nearby village, where he is renting a small sewing workplace in order to provide for his family. He lost his father because of the landslide. A lot of livestock was killed, among which was a chicken farm and nine oxen (Ibid.). Like the villagers extracting rocks that were mentioned before, mister Dawai never assumed that a landslide could occur in his village. He remarks that if he had been aware of the fact that he was living in landslide vulnerable area, he would have never build his house in the area that he was living (Interviewee 80). According to him, the main factor that triggered this landslide was rainfall. For two days, there was a steady rainfall, which made the soil weak. Then, during the night time, there was a heavy rain for just twenty minutes, which triggered the entire landslide to come down on the village. Most of the survivors of the landslide migrated to a safer place, although there are still three small huts that were rebuild on the same spot where the village used to be. In spite of several warnings by the government that this spot is still unsafe, the huts are still being used for business purposes (Interviewee 80).

In Satakhani, community members and NGO workers from time to time come together in a meeting, in which they discuss the main disaster risks of the Satakhani community (Interviewee 86). After the beforementioned landslide and flood hit the Satakhani community, the principal of the Satakhani high school organized talks about landslide and flood risk in their community, with the aim to raise more awareness among the communities' children. The high school principal and the Red Cross member both mention that since the disaster of 2014, they learned that identifying the areas of risk for the community is one of the most important activities relating to landslide risk adaptation. Also, those areas should be used for farming and never for housing purposes according to them (Ibid.). The two interviewees discern three adaptation activities that are most important to the Satakhani community: the plantation of trees to strengthen the hillside slopes, the building of walls, and the raising of awareness among the inhabitants in schools or special gatherings (Ibid.).

According to the respondents, the people living in Satakhani have become more aware of the risk landslides pose to their community. After the 2014 landslide, they didn't let their cattle graze in areas that could be vulnerable to landslides anymore. This was done because they know that the

grasses and trees that grow on the hill slopes strengthen the soil, reducing the chance for landslides (Interviewee 71).

With respect to disaster response, the VDC has set up a new fund for disaster relief in response to the 2014 landslide and flood. They have done this in coordination with the Red Cross society, who have also trained 94 people in the Satakhani community, and grouped them in a Risk Management Committee. This committee has set up an action plan, which has used an interactive disaster map to take into account all the possible disaster risks for the Satakhani community. By using this map, the committee can coordinate response operations much better (Interviewee 81).
According to the VDC secretary, the most important adaptation activities for the community are tree plantation and marking risk areas (Interviewee 82). In his daily work as a secretary, adaptation to landslide risk is not a big issue. He remarks that there are many issues in the Satakhani VDC, and that landslides are quite unimportant with respect to the other issues he has to deal with (Ibid.). So as a political representative, he doesn't really focus on the promotion of adaptation strategies concerning landslides. Also, when asked about his experience with adaptation strategies employed by the people living in Satakhani, he replies that to his knowledge, the villagers do not adapt to landslide risk. This is mainly due to the fact that people are engaged in other work. Because of this, they are not taking into account the potential landslide risk in their daily livelihood activities (Ibid.).

The village of Hariharpur in the Surkhet district was also hit by a small landslide in 2014. The impacts of the landslide on local livelihoods and the dependency and distribution of resources needed for adaptation are reported through interviews with two internal stakeholders; a local inhabitant of the village, and a local contact of the NGO Beautiful Nepal.

Like with the Satakhani landslide, this landslide was triggered by heavy rainfall, according to the villagers (interviewee 100; interviewee 104). The landslide itself did not affect any agricultural land or buildings, but it did block the flow of the river. Rocks and broken branches of trees accumulated within the river, causing the river to rise, eventually flooding the lands beside it and causing a bridge to collapse. 28 households were directly affected by the flood, which was triggered by the landslide (Ibid.). Their houses were swept away, forcing these people to move to another place. This combination of landslide and flood was the first disaster to hit the Hariharpur village in 200 to 300 years, which made the villagers highly unprepared for and unaware of the risk (Ibid.). As an effect of the landslide and flood, embankments were built on some places alongside the river by the District office.

Because there had not been a landslide affecting the centuries, there were no adaptive activities that were taking place in the community in 2014 (Interviewee 104). In the days prior to the landslide, the villagers saw that the river was rising because of heavy rainfall. Their reaction was to put stones at the river side to divert the flow of the river away from their fields. When this didn't seem to help, the villagers tried to put even more stones in the river, eventually blocking the way of the stream. This led to the accumulation of too much water, which according to a local inhabitant, contributed to the triggering of the landslide. Because the landslide also hit the river, the flooding became even worse.

After the disaster, one of the community members was assigned as a social mobilizer, to function as an intermediary between the community members and an NGO called Beautiful Nepal. He explains that the most important adaptation strategy to the landslide and flood risk is the building of embankments along the riverside. They have mainly been building these embankments near important buildings like the school or the neighbourhood house (Interviewee 104). An environmental and climate change coordination committee has also been set up, which is responsible for discussing the most important issues and hazards for the village that are a consequence of climate change. This committee consists of three different subcommittees: the rescue and first aid committee, the information collection and survey committee, and the livelihood and preparation committee (Ibid.). Together with the community members, the social mobilizer mainly focusses on preparing for new disasters. This is done by mapping the present and future disaster risk of the community. This can be any kind of disaster, like forest fires, floods, but also landslides. They do this by organizing a community level assembly, in which one member from every household (mostly men) get together to discuss and map past, present and future disaster risk of the community by drawing a map, in which every member contributed his or her knowledge about disaster risk for the community (Ibid.). Besides that, the community is planting trees on hill slopes and building embankments on the riverside. They have contacted the VDC office to ask for more budget for these activities, but have not received financial support from them (Ibid.).

4.1.2 Institutional Adaptation in Surkhet District – External Stakeholders

In the Surkhet district, five external stakeholders were interviewed on the topic of institutional adaptation in the Surkhet district. Four of them are NGO workers, and one of them is a government official, working for the District Soil Conservation Office of Surkhet.

According to the District Coordinator of the NGO KIRDARC Nepal, an important issue concerning DRR efforts and the management and implementation of DRR policies, is that there is a lack of communication between implementing agencies (like the DDRRC) and communities that are vulnerable to disaster (Interviewee 92). For instance, the VDC of Satakhani had been warned by the DDRRC that it was likely that a landslide would hit the village, but somehow the villagers never knew about the risk they were living in (Interviewee 63). Megha Raj Neupane, the District Coordinator of the NGO KIRDARC Nepal, mentioned that the Nepali government does not have enough resources to effectively introduce DRR guidelines on a community level in Surkhet, let alone on a district level. According to him, this is where an NGO like KIRDARC can help compensate for the ineffective DRR strategies of governmental institutions: "Nepal government has a guideline, we take that guideline, and then with our help we form risk committees on the VDC level. Then we make the community people aware about the disasters how we manage the disaster and how local people can deal with the risk from disasters" (Ibid.).

This notion that (local) institutions lack resources to effectively implement adaptation strategies is also confirmed by several governmental stakeholders. For instance, the assistant soil conservation officer of the soil conservation office in Surkhet emphasizes that although he thinks that the soil conservation office is doing good work by building protective walls in the embankments of rivers and planting trees and grasses to enforce the soil, there are only few governmental institutions that are thinking about the prevention of landslides (Interviewee 93). Also, he often experiences conflicting interests between the District Development Office (DDO) and the Forest or Soil Conservation Office. When the DDO wanted to construct a road through a forest next to one of the VDC's in Surkhet, both the Forest and Soil Conservation Office were excluded from the decision making process, making it impossible for them to conduct an environmental examination of the construction plans (Ibid.).

The Surkhet based NGO Beautiful Nepal Association are implementing twelve adaptation projects in different VDC's in the Surkhet district. In doing so, they supervise the planning, management, implementation, evaluation, monitoring and reporting of these projects. Before starting these projects, the NGO did a survey among several VDC's in the Surkhet district. This survey found that focussing on aiding communities in adapting to disaster risk was far more effective than only implementing mitigation strategies such as the building of embankments (interviewee 98). In each VDC a Local Adaptation Plan for Action (LAPA) is being written. This is done by organizing a three day LAPA writing workshop, where all the important stakeholders of the respective VDC gather together. Examples of important stakeholders are representatives of the Forrest Committee, agricultural sector and the drinking water and sanitation sector. During this three day workshop, they gain as much (local)

knowledge as possible about past and present disaster risk in that locality, which then is converted into the LAPA document of that VDC (Ibid.). Next to that, most of the selected VDC's receive an adaptation fund of 200.000 rupees so that the VDC can prioritize those activities that are needed in their locality to effectively adapt to climate change (Ibid.; interviewee 97). The Harihadpur VDC named earlier has for instance received 500.000 rupees in order to adapt to flood and landslide risk effectively (Interviewee 98). Next to helping the VDC with the construction of embankments in high risk zones, the NGO also gives several trainings that aim to increase the resilience power of the community: "the final motive of our project is building resilience power, with adaptation to climate change. So either in a direct or an indirect way, we are working on increasing the resilience power of a specific VDC" (Ibid.). The most important stakeholders the NGO is working together with during these kind of projects are the District Development Committee, the District Administration Office, the District Forest Office and the District Soil Conservation Office (Ibid.). The effectivity of a project depends in a large part on the social mobilizer that a NGO has put in the respective VDC. This local NGO employee functions as a very important link between the District level and the more local VDC level. Because he interacts with the community, identifies their problems, and tries to integrate the communities' problems and issues into the project models (Ibid.; Interviewee 97).

The importance of a social mobilizer can be illustrated by the work that is done by one in the Hariharpur community. There, a social mobilizer fulfils an important role in implementing adaptation efforts in the community. As a representative of a NGO based in Surkhet, his work as in the community mainly entails finding and identifying risk zones together with the Harihadpur villagers. They do so by mapping these zones, and identifying the possible risks of the specific zone through the knowledge of the villagers (Interviewee 104). Next to that, both through governmental and NGO funding, walls have been build alongside the riverbanks to protect from flood risk, and tree plantation projects have been initiated by the social mobilizer. According to him, the village has become a lot less vulnerable to the effects of floods and landslides since he began his work there together with the villagers. This became apparent when a small landslide triggered a flood past summer, but no houses or fields were affected by this because the embankments could resist the flood and protect the villagers' properties. Although the embankments had to be rebuild after the flood had hit them, they effectively protected the village from harm (Ibid.). Although these efforts have seemed to protect the village from harm up until now, the social mobilizer does have his doubts about the future vulnerability of the Hariharpur community. Especially with respect to the rapid increase in disaster occurrence around the village - mainly of landslides in combination with floods -, he emphasizes the importance of strategies that increase the preparedness of the community to these potential hazards (Interviewee 104).

Laal Bahadur, an employee of the Women's association for marginalized women, remarks that one of the biggest issues with respect to projects he works on in Surkhet district, is the low awareness level of a lot of people living in high disaster risk areas (Ibid.). For instance, even when trying to set up tree plantation projects, it is often hard to communicate this with the villagers. "(...) they say 'do we need to plant trees? No need to plant trees, because trees grow by themselves!' ". This also is a big issue during DRR meetings on the VDC level, where local participants often have a lack of knowledge concerning the DRR related topics that are being discussed, making effective decision making hard during these kind of meetings (Ibid.). Because of this low awareness level of inhabitants of most of the more isolated settlements in Surkhet district, it is often hard for him to effectively implement DRR strategies in a disaster risk prone VDC (Ibid.; Interviewee 98). In most of these cases, people do not want to make time for these activities, because they want to work for themselves, and usually they don't have time besides their daily livelihood activities to plant trees or help with other mitigation or adaptation activities. This led to the creation of an economic incentive: for each tree planted, five rupees were payed. Because of this, they effectively planted 10.000 trees in this VDC together with the local population, leading to a better control of soil erosion in that village (Interviewee 97).

4.1.3 Analysis & Concluding Remarks

With respect to the individual vulnerability of local communities in Surkhet district, there was a clear level of resource dependency with respect to stone cutting. When warned about the risk of landslides by the District office, the villagers of the Satakhani community downplayed the risk, possibly in order to be able to keep cutting rock. Also, local inhabitants weren't always well informed about their own resource needs for adaptation to climate hazards. This could also lead to a higher degree of individual vulnerability, and also collective vulnerability; if the resource priorities of the individual households are not in line with their actual adaptation needs, this will also affect the distribution of resources on the collective level in these communities in the future. In the Hariharput community the reaction was to put stones at the river side to divert the flow of the river away from their agricultural fields. When this didn't seem to help, the villagers tried to put even more stones in the river, eventually blocking the way of the stream. This led to the accumulation of too much water, which according to a local inhabitant, contributed to the triggering of the landslide. Because the landslide also hit the river, the flooding became even worse and led to the flooding of the agricultural fields. Here, the adaptation to possible impact was guided by the villagers dependency on resources, but eventually ameliorated the negative impacts of the flooding, causing landslides and even greater negative impacts on their

livelihoods.

With respect to collective vulnerability of the Hariharpur community, it is interesting to note that with the help of the NGO Beautful Nepal, a community level assembly is set up, in which all individual households are represented. Within this assembly, a more 'equal' distribution of resources for adaptation is achieved according to the respondents. They also implied that this then ameliorated the communities' capacity to adapt. Important was the institutional response to the budget request of this assembly: budget was not given, but it remained unclear why this was the case.

With respect to the appropriateness of the institutional adaptation to landslides in Surkhet district, two findings are important. First, the district coordinator of the NGO KIRDARC noted that there is a lack of resources among institutions on the national level to create and implement strategies for adaptation in the MWR: "The Nepali government does not have enough resources to effectively introduce DRR guidelines on a community level in Surkhet, let alone on a district level". It remained unclear why this was the case. The question arises if there really exists a lack of resources among national level institutions, or if there is a lack of *appropriate institutional response*? Especially because the assistant soil conservation officer of the soil conservation office in Surkhet emphasizes that although he thinks that the soil conservation office is doing good work by building protective walls in the embankments of rivers and planting trees and grasses to enforce the soil, there are only few governmental institutions that are thinking about the prevention of landslides. Most importantly, he often experienced conflicting interests between the District Development Office (DDO) and the Forest or Soil Conservation Office, which both have different policy aims. When the DDO wanted to construct a road through a forest next to one of the VDC's in Surkhet, both the Forest and Soil Conservation Office were excluded from the decision making process, making it impossible for them to conduct an environmental examination of the construction plans. this implies that there are enough resources to finance development projects as the construction of new roads, but not to set up an environmental examination of such development plans. This is a clear sign that state and district level institutions are in fact developing institutional response that is inappropriate to the threat that landslides pose to the livelihoods of local communities in the Surkhet district. Next to that, because local informal institutions like the NGO KIRDARC adopt the guidelines of the district- and state institutions, and implement strategies that could possibly exacerbate the social vulnerability of local communities to landslides. For instance, some VDC's in the Surkhet district receive an adaptation fund of 200.000 rupees to prioritize those activities that are needed in their locality to effectively adapt to climate change. The question remains which policy rationale the VDC will adapt in order to prioritize resource allocation for adaptation to landslides. In the case of the Hariharpur community, respondents reported that through the work of the social mobilizer their understanding of the appropriate individual resource needs and

the equal distribution of those needs on the collective level improved, leading to more effective adaptation to landslides that followed. On the other hand, the opposite could be said about the Satakhani community, where there was a high level of individual and collective vulnerability as a consequence of the wrong ideas about the individual and collective resource needs that were needed for adaptation to climatic stress on their livelihoods.

4.2 Mugu District

4.2.1 Individual and Collective Vulnerability in Mugu District – Internal stakeholders

In the Mugu district, the district headquarter Gamgadhi and Kache village were visited. In Mugu, landslides come third in the districts' hazard ranking, with floods and fires being the districts' first two major hazards (Interviewee 65). In Gamgadhi, it is mainly common livelihood practices that lead to the degradation of hill slopes surrounding the town. According to a local NGO worker, one very important practice leading to the creation of so-called 'gullies', which then sometimes lead to the creation of bigger landslides, is deforestation. Ramesh Shrestha, who works for the NGO Mission East, explained that the mechanism behind this could be characterized as the 'tragedy of the commons'; the natural resources in the proximity of Gamgadhi village will have to suffer from the tragedy of the commons at one point: "Because most villagers cut as much wood they need for themselves, at some point the area will become degraded, leading to increased landslide risk" (Interviewee 65). A second important determinant of landslides at Gamgadhi is the building of roads. In the proximity of the town as well on the road to Kache, a number of gullies have been observed that were formed as a result of accumulated rubble from road works: "These kind of gullies can later expand into bigger streams of mud and rubble, creating landslides" (Ibid.). According to Mr. Shrestha, this shows the important role of unmanaged road works in the Mugu district in relation to landslide occurrence (Ibid.). Most of the contacts of NGO's called this 'unplanned development'. After the civil war, democracy was introduced in Nepal. From this moment on the Nepali government started the building of more road networks in order to foster the economic development of the country (Ibid.). The biggest issue here is that most of the mandatory assessments that are being used for these road works do not take into account non-economic costs like environmental damage. This leads to road works that are badly monitored and planned. Because most of the villagers in Gamgadhi and Kache do not have the means to move away from their current village, they tend to migrate closer to these unsafe roads, which then leads to a higher rate of vulnerability for these communities (interviewee 62).

In Kache village and its surroundings, two to three people die every year as a consequence of landslide occurrence (Interviewee 72). Road construction plays a dual role with respect to landslide risk. On the one hand, the construction of the road is causing small landslides that sometimes hit the agricultural grounds of the village or block the path to the village, which makes it harder for food or other goods to reach the village (Interviewee 71). On the other hand, because some of the villagers have been put to work at the road construction, less of the forest surrounding the village is being cut down, leading to an increase in forest coverage and stronger soil in those areas. A farmer living in Kache remarked that he feels that climate change is really affecting their livelihood practices as a result of changing rain patterns. Five years ago, it was possible to cultivate apples and rice in February, whereas now the cultivation of apples is no longer possible and rice can only grow from April (Interviewee 72). This leads the villagers to replace parts of the forest with rice fields, sometimes leading to degradation of the soil quality in those areas, and an increase in landslide risk in these parts of the village.

In the Mugu district, very little is done by local inhabitants with respect to adaptation activities to landslides, or other types of hazards. In the Kache village, most of the women get together in a so called Women's Group, in which they discuss – among other things – in which ways they can adapt to landslide risk in their locality (Interviewee 69). One of the main issues is that most of these women do not have enough time to work on these kind of activities. Instead, most of their time is spend on day to day livelihood activities, like cooking and taking care of their cattle. This makes it hard for them to focus on adaptation activities to landslides (Ibid.). One way in which the villagers in Kache do adapt to landslide risk is in the building of new houses. They consciously construct houses that have stronger foundations than the older houses, reducing the chance that the house will be swept away when a landslide hits the surrounding grounds. Also, they plant trees and grasses on slopes that seem to be susceptible to landslides (Ibid.).

Figure 6: Kache village, agricultural fields affected by rubble of landslide (left side of the fields).

4.2.2 Institutional Adaptation in Mugu district – External Stakeholders

In the Mugu district, three external stakeholders were interviewed on the topic of institutional adaptation in the Surkhet district. They all three work for the Karnali based NGO KIRDARC, and have extensive experience with the implementation and effects of adaptation efforts and projects to climate hazards in local communities in the Mugu district.

Most of the district head offices of governmental institutions and NGO's are situated in Gamgadhi. According to Gobinda Shahi, the program coordinator of KIRDARC: "The District Coordination Office is the leading office when it comes to DRR efforts in the Mugu district, and mainly focuses on response activities after a disaster has occurred in the district. Despite awareness raising activities, fatal casualties still occur due to landslide risk in Mugu." (Interviewee 65). Mr. Shahi emphasizes that awareness raising activities are the most important activities KIRDARC employs in the Mugu district, especially because most of the vulnerable communities in Mugu are very isolated. This means that it usually takes a long time for aiding agencies to reach these villages, making it even more important for these communities to be aware of the risk they are facing, and to know what they can do themselves

before and after a disaster has occurred (Interviewee 65). Next to these awareness raising activities, another important aim of KIRDARC activities in the region is prevention. This for example entails mitigation activities like the plantation of trees and grasses (Ibid.). An issue for KIRDARC in Mugu district is the lack of modern technology or road connection to communicate with local communities. To overcome this issue, they make use of the community radio to also inform the more isolated villages about disaster risk issues and what they can do to minimize risks. Especially in times of heavy rainfall, they broadcast a lot to make sure that the isolated villages are well informed about the higher landslide risk and what they can do to minimize that risk (Ibid.).

Like in Surkhet, Mugu also has to cope with the negative effects of road construction. Because of this, KIRDARC and other NGO's that are active in Mugu district are working on what they call a 'Disaster Risk Reduction mainstreaming component' for road construction or other development projects that can have negative impacts on the local livelihoods (Interviewee 63; Interviewee 65). This means that they are incorporating DRR strategies into mainstream development practices like the construction of roads, developing work orientation programs that make sure that roads are being constructed in a safe and sustainable way (Interviewee 65). One of the strategies KIRDARC employs for reaching this goal is to set up women groups and create awareness among these women about the negative impacts road construction can have on their direct living environment. In some cases, this actually has led to better road alignments and better managed road works (Ibid.).

In Kache village, a road construction project close to the village is having a dual effect with respect to landslide risk. This project has been initiated by the VDC. The road construction project is creating work for the inhabitants of Kache, leading to a better economic status of the village, but also to a decrease in the cutting of trees: "once people are engaged, they have little time to concentrate in other activities, like cutting down the trees. When they're free, they cut down the trees more than they need" (Ibid.). This means that on the one hand, the project is indirectly leading to a better condition of the soil and an increase of forest coverage in the direct proximity of the village. This then leads to a decrease in landslide risk for the village. On the other hand the road construction is leading to an increase in debris flows and landslides (Interviewee 71). The VDC has allocated 150.000 Lakhs (1200 euros) that the village can use to distribute resources among the community in order to adapt to the impact these landslides have on the livelihoods of the community. At the time of the interview, the community had not yet decided on which specific resources the money will be spend. The Local Disaster Risk Management Committee will discuss what the money will be spend on (Interviewee 72).

In a meeting with the LDRMC, Govinda Bashnet – a Nepali researcher that works for several NGO's – talked with them about how this committee allocates its recourses:

> "So this year they allocated a budget. And we asked about do you have all that amount in your account? Or did you already spend some? And they spend some. And some of the money was spend really directly on support of when one house was affected by slide, they gave them support. And others they gave it for the treatment of one cancer victim, and I said 'ok well that was very good, you have given support to someone who could otherwise not be treated'. But that money was for disaster, but that was not decided. I asked them 'how do you justify that?' And they said that this was an emergency issue, and therefore they have decided that it also falls under that category" (Interviewee 73).

According to the interviewee, the reason the LDRMC used the DRR budget on the treatment of a cancer victim, instead of on a DRR activity, was because they did not yet have a document about fund management guidelines or further assistance by a NGO or government agency (Interviewee 73).

4.2.3 Analysis & Concluding Remarks

In Kache village, individual households adapt to changing rain patterns that are an effect of climate change. They do this by cutting down trees and planting rice fields there. Because of the resource dependency on the individual level, they create soil degradation, creating small landslides from time to time, negatively impacting their fields and walking paths that provide the community with important resources. These adaptation strategies of individual households deteriorate their own individual vulnerability.

Second, an important development practice that influences the individual and the collective vulnerability of the Kache community is road construction. The construction of roads negatively influences exisiting infrastructure in the shape of walking paths that enables resource allocation to local communities. In doing so, it deteriorates both individual vulnerability and collective vulnerability of the Kache village, restraining the community from resources to adapt to landslide impact. This negative effect is then strengthened by the fact that individual resource dependency and affiliated livelihood activities are not in line with the communities adaptation needs. Also, this leads to a situation in which investment in strengthening the collective vulnerability through the women's group is constrained by aspects of household resource dependency and so deteriorates factors of individual vulnerability.

At the same time, a respondent reported that the villagers seemed to be able to collect sufficient resources to build new and stronger houses that enable to adapt to landslide occurrence, which implies that in spite of the before mentioned deteriorating effects of road construction on the dependency of resources and the equal distribution of these, some capacity to adapt still remains in the Kache community. Where or how the local inhabitants were able to obtain these resources to constrict these new houses remained unclear.

With respect to the appropriateness of the institutional adaptation process in this case, the use of the community radio by the NGO KIRDARC was an important appropriate institutional response to possible hazard impact. By informing local communities that are hard to reach through a radio show about ways to allocate resources to adapt to possible landslide impact, they were able to positively influence the factor of collective vulnerability of these communities. Also, in allocating a fund of 150.000 Lakhs to Kache village, the VDC of the locality enabled the community to distribute resources among the community in order to adapt to the impact these landslides have on the livelihoods of the community. This can be seen as a clear sign of appropriateness in relation to landslide risk caused by the consruction of roads. This Institutional response lead to a counterbalance to the poorly managed road constructions. By involving the local inhabitants, collective vunerability factors can be incorporated into the road construction process, leading to a better use of resources that are needed to adapt to the possible stress of roadwork landslides. Still, some of this money was not spend on to adapt to landslide risk, but to the medical treatment of a local cancer victim. To a certain extent, this confirms the assumption that institutions determine the capacity of local communities to adapt. If the factors of individual and collective vulnerability lead to a deterioration of the allocation amount of resources, institutional supervision was needed in this case to avoid the misallocation of collective resources, negatively affecting the current and future capacity of the Kache community to adapt to landslides.

4.3 Jumla District

4.3.1 Individual and Collective Vulnerability in Jumla district – Internal Stakeholders

Within the Jumla district, the district capital Jumla and Hanku village were visited. On a thirty minute drive from the Jumla headquarters, Hanku village lies between a mountain and a river. Here, since three years, a landslide occurs on the same spot, affecting the daily lives of the villagers. The landslide is an effect of unmanaged road construction, and occurs every year during the monsoon season. Because of the heavy rains, rubble from the construction falls down into the river that flows

underneath the new road, blocking the stream of the river. As a consequence of this, the river floods, affecting the fields and buildings besides it. Although up until now no one was killed because of the landslide, the livelihoods of the villagers are severely affected. In one of the three cases, a bridge that connects Hanku village to other settlements in the area was swept away because of the high water level after the landslide. Transportation between the village and surrounding settlements stopped, leading the other settlements to become isolated for a while. The most important effect of the landslide and the flooding of the river is that the agricultural fields that lie besides the river are completely flooded, destroying the crops and leaving the soil completely infertile. This of course has a huge negative effect on the living standard of the village, especially for its poorer inhabitants. Their livelihood depends on the yield they can make by growing crops on these fields. Another effect of the flooding is that the community school has to be evacuated. Because it stands in close proximity to the stream, the risk of the building to become flooded is too high, so educational activities have to be continued elsewhere (Interviewee 111). Also, the local inhabitants seem to be unable to adapt to the impact of these hazards on their own: "The villagers themselves do not have sufficient knowledge and resources to adapt to this landslide and the flooding: they depend on the building of the walls by the VDC, which often does not suffice unfortunately" (Ibid.)

4.3.2 Institutional Adaptation in Jumla District - External Stakeholders

In 2016, the VDC of Hanku has put some embankments and blocks at one side of the road where the landslide occurs, which have managed to stop a part of the rocks from falling down on the road and in the river. According to the Karnali region climate change coordinator, more has to be done on the local level with respect to adaptation activities to landslides and other disaster risk (Interviewee 110): "More has to be done to identify the difference between adaptation and development activities. In some cases, there is overlap of course, but development is about poverty reduction, and adaptation should be in line with vulnerability. (...) We are not supposed to give them the schools, the roads, the store houses, we have to give them adaptation related activities. (...) So we are in the process of identifying between the adaptation activities and development activities." (Ibid.). One very important issue that specifically pertains to the adaptive practice in the Jumla and Mugu region, is that the forest, agricultural fields, and the settlements usually are 'integrated' within a relatively small piece of land. In the lower terrai region of Nepal, these are all more segregated. Because of this density, communities in the Jumla district have to develop more complex adaptation strategies to landslide risk, for which they often do not have the resources or knowledge (Ibid.).

Also according to the external stakeholders that were interviewed in the Jumla district, unmonitored road construction is an important factor of landslide vulnerability (interviewee 109). In an interview with the regional climate change coordinator of the Karnali district, he named this practice 'ecological terror':

> "I'm talking about terror! Terrorists! Terror of making roads from house to house. The politicians taking these roads to their house to house. (...) For example, you see our side here, you see the hill. There are nine households there. One household is belonging to one [political] party, another household is belonging to another [political] party. (...) And with the coming of political instability, everything is having an impact on our ecology. They are taking excavations there to take out to excavate land, to make more room for the roads. And they are not replacing the cut trees. They are not replacing them, not planting the trees on the sides of the roads, they are just excavating the soil! What is happening downstream, all the debris of the trees and road and rocks is coming down and making a landslide. This is one of the examples! (...) Now, in these hills and mountains, there is 'ecological terror'! Terror! (...) As a forester I would say, I would define that activity as terror. Ecological terror!" (Ibid.)

Figure 7: Landslide spot at Hanku village. Degraded slopes between road and river cause yearly landslides that block the river and cause it to flood

According to him, the main problem in cases of 'ecological terror' is that development policies - among which are the construction of roads – lead to environmental safeguard issues. This started around seven years ago, when the national government started to construct a road network in the district. When the roads are constructed, the leftover materials are not disposed of properly, leading to erosion

of the soil slopes when rainfall comes (Ibid.). “One fully grown tree can hold eleven tons of soil, if you cut one tree, and multiply it with one thousand trees, how much soil will you lose? Very unsustainable!” (Ibid.). According to the interviewee, this issue specifically pertains to the Jumla district. Jumla is part of the Himal higher mountain region, but despite having high mountain status, the ground in the Jumla district is relatively flat, making it easier to develop a road network in the district. In the past, the interviewee has also asked the District forest officer why he was not mitigating the effects of road construction by planting new trees there. He replied that he was imposing “all the grid he could” on the politicians who were initiating the road construction, but that they would not listen to him (Interviewee 72).

In Jumla, the District Development Office (DDO) is an important stakeholder with respect to the development and implementation of policies that relate to economic development of the district. Their strategies mainly focus on the biological interface of the area (Interviewee 109). In the past decades, the majority of the district’s development budget was spent on construction of new irrigation canals, store houses, roads and airports. “Now, a good portion of this budget has been reserved for projects that try to create a better ‘biological interface’ of the area. This means that mainly in the field of forestry and agriculture, these efforts are being implemented” (Ibid.). The DDO supports communities by monitoring their Local Disaster Risk Management Committee (LDRMC) when it is creating a Local Adaption Plan for Action (LAPA). Still, it is the LDRMC itself that creates and implements these plans.

In the village Hanku, the LDRMC has used this budget to build a wall to protect the school and road from the effects of the landslide that occurred on a yearly basis. During the visit to the village, this wall was already degraded, and obviously in need of maintenance. When asked about this, a villagers said that the LDRMC and a local NGO that were supporting the village didn’t have enough budget to maintain the walls that were built to protect from the landslide. Also, unlike in other communities visited before, the NGO and LDRMC do not try to set up awareness raising programs to help the inhabitants of the local village adapt to or prepare for the risk of the yearly landslide and flood (interviewee 111). A villager remarks that this is because there is a lack of DRR budget in their district: “They don’t have budget to raise awareness. The NGO never sees the village, and they don’t decide anything for the village. They only decided that this is the budget, but never used that for protection from the landslide” (Ibid.).

4.3.3 Analysis & Concluding Remarks

In the Hanku village, not much data regarding the individual and collective vulnerability of the community has been gathered unfortunately. It is clear that again road construction is an important variable in the creation of a hazard that affected the livelihoods of this community. As was also the case in the Kache community in Mugu district, the road works created hazards that negatively infliuenced the resources dependency of the Hanku community. Because of the yearly flooding of their agricultural fields, the individual vulnerability of the community is gradually deteriorating. This in turn also makes the inhabitants that own these fields more poorer, leading to a more unequal distribution of resources within the community, neatively affecting the collective vulnerability in the Hanku community.

The institutional response to these problems unfortunately do not address the underlying causes of the landslide and flood. The only institutional adaptation that has been undertaken by the VDC of the village, is the construction of protective walls further up the road, which protects a part of the underlying road and river from the landslide. This engineering practice was the only way that slope failures in the village were managed. In the case of Hanku, the question remains how long the stone wall will protect the village, since it was already starting to crumble and shift as a result of holding back one landslide.

5. Discussion

5.1 Validity of the research

Validity of the research was ensured by member checking. This was done by repeating the answers of other respondents during an interview with another respondent. For instance, when doing an interview with the VDC secretary, the answer of a local villager from the same village about his awareness about landslides and usage of adaptive strategies by the community was repeated to the secretary. This ensured the credibility of the answers given by most of the respondents.

5.2 Limitations to the research

Although an extensive body of literature on social vulnerability to landslides exists (Petley et al., 2007; Devkota, 2014; Regmi et al. 2014; Oven 2009), a general lack of prior studies on vulnerability to landslide risk of local communities in the MWR has led the scope of this research to become quite broad. On the other hand, it also has served as an important opportunity to identify gaps in the literature and describe the need for further research (see section 5.6).

On two occasions during a field visit in Surkhet district, the access to the research site was dangerous or minimal. In one case a landslide had obstructed the path to the village, and in the other the path to the village was deemed to be too unsafe because of prior rainfall. Because of this, these communities were not visited, which limited the number of cases used for this study.

The data gathered for this study was gathered through conducting face-to-face interviews with local inhabitants of landslide prone communities, governmental workers, and NGO staff in the MWR of Nepal. This means that this research depends on self-reported data. With regard to their answers to the researchers questions, the respondents could have exaggerated, or have a selective memory which would have influenced the reliability of the answers that were given. For instance, a local inhabitant could have attributed a positive value to his own action, but a negative value to those of the Village Development Office. This is why whenever this was suspected during the research, the researcher has always used member checking to avoid this limitation.

5.3 Suggestions for future research

As has been brought up by several respondents, local elections were coming up in Nepal in the summer of 2017. These local elections were the first to be held since the promulgation of the Nepali constitution in 2015. Several of the respondents – especially the external stakeholders who were working for an NGO or the government – were hopeful about the positive effects these elections could have on the accountability of (local) political bodies. Further research on the effects that this decentralisation could have on the way that formal institutions are seeking to maintain their resources, powers, and their authority in a time of rapid change in Nepal could be useful.

Respondents in each of the three districts remarked that what is needed in a lot of cases firstly is the political commitment to reach this integration. This would then lead to more decisive action on the part of the Nepali government to integrate Disaster Risk Reduction into existing government policies. In every district, respondents were hopeful about the local elections, because they believed this would bring more political accountability. As Blaikie et al. (2014) argue: "accountability builds trust, and trust allows access to the inner workings of local coping mechanisms. When these are translated into architectural form, there is the possibility of designing low-cost, safer shelter with local people as partners" (Blaikie, 2014: p. 189). Especially with respect to the functioning of LDRMC's of vulnerable communities in the MWR, the effects of more political accountability through local elections would be an interesting avenue of research .

6. Conclusion

This research has sought to assess the social vulnerability of local communities to landslides in the Mid-Western Development Region (MWR) of Nepal. This was done by investigating the individual and collective vulnerability of local communities in the MWR, and the institutional adaptation process that influences the capacity to adapt to landslides. This has been done for a total of five case studies in three districts of the MWR: Surkhet, Mugu, and Jumla district.

Social vulnerability was defined in terms of the capacity of individuals and social groupings to respond to – that is, to cope with, recover from or adapt to – any external stress placed on their livelihoods and well-being, focussing on socio-economic and institutional indicators that can limit or enhance the ability to respond effectively to a hazard in the form of landslides. Vulnerability is intrinsically linked to the process of adaptation through this definition; adaptation is facilitated by reducing vulnerability.

Furthermore, two dimensions of vulnerability - scale and knowledge domain - were discerned in order to create a better understanding of the concept of vulnerability, and create a clear scope of analysis for the data that were found. Within the scope of this research this was done by using resource dependency and inequality as an indicator of individual and collective vulnerability on the internal scale, and institutional adaptation as an indicator of the most important determining factor of the overall social vulnerability.

The following main research question, and two sub-questions were developed:

What is the social vulnerability of local communities in the MWR to the impact of landslides, considering their individual and collective vulnerability, and the institutional adaptation of formal and informal insitutions?

Which resources are needed to adapt to landslides and how are these resources distributed by internal stakeholders of local communities in the MWR?

How does institutional adaptation of external stakeholders affect the vulnerability of local communities in the MWR?

Thirty-three semi-structured interviews have been conducted with both internal and external stakeholders of five local communities. This was done in order to cover the internal external divide of the concept of vulnerability while gathering data. Internal stakeholders are: representatives of local government bodies (like the Village Development Committee), local people that have experienced landslides in their locality or are living in a landslide prone site, and NGO workers that are working on the local village level. External stakeholders are: representatives of governmental bodies (e.g. the District Development Office or the District Soil Conservation Office, etc.), academics who are studying landslides in Nepal, and NGO workers working at the district or national level.

The case studies have revealed all three chosen indicators play an important role in the determination of overall social vulnerability of local communities in the MWR to landslides. They have also revealed the complexity of the processes that shape vulnerability, suggesting that we are far from the level of understanding that would permit a detailed model of how vulnerability is constructed to be advanced.

With respect to the individual vulnerability of local communities in Surkhet district, there was a clear level of resource dependency in all observed cases, and a varying degree of inequality of the allocation of resources within the community, that determined the collective vulnerability. The institutional adaptation process that determines and influences these two aspects of vulnerability were often not well established, making it difficult to weight the various factors and, to determine the sign of the overall effect in some cases. Because of this, more research into the appropriateness of the institutional response is needed.

It was posed that adaptive capacity designates the resources and skills available to a community to carry out adaptive strategies or measures in a local context. This research has found that although there is not a direct relationship between the strength of local organisations and reduction of vulnerability to disaster, one could argue that the results of the research show that the converse is certainly true: in the absence of the capacity to adapt to landslides, the vulnerability of local communities in the MWR to landslides increased. By addressing vulnerability in a comprehensive manner current populations are enabled to address today's climatic extremes and other threats and are better equipped to cope with future uncertainties.

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