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LIVING WITH FLOODS ALONG THE KARNALI RIVER

A CASE STUDY OF ADAPTIVE CAPACITY IN RAJAPUR AREA, NEPAL

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Abstract

This study addresses adaptive capacity to floods. We employ a case study method with two units of analysis comprising the villages of Shankarpur and Murgahawa, located in a flood prone area by a branch of Nepal's largest river, Karnali. Our study describes the response cycle that the residents of these communities employ; their strategies to adapt to, cope with, and recover from floods. We analyse how these activities are steered by what we see as the central parts of adaptive capacity, access to resources and social learning. Finally, our study identifies a set of social factors that limit the adaptive capacity of individuals and the communities as a whole. We conclude that the persisting unequal power relations limit the adaptive capacity of marginalized social groups and impede women from learning crucial skills. Weak social relations hinder the process of social learning. These factors have a negative influence not only on individuals but also on the adaptive capacity of the communities as a whole.

Keywords:

Adaptive capacity, floods, social learning, access to resources, social relations, power relations.

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Abbreviations

CBO	Community Based Organisation
CDMC	Community Disaster Management Committee
DFID	Department for International Development (UK)
DMH	Department of Meteorology and Hydrology (Nepal)
DRR	Disaster Risk Reduction
EWS	Early Warning System
FGI	Focus group interview
GNI	Good Neighbors International
HHI	Household interview
IPCC	International Panel on Climate Change
KII	Key informant interview
MOHA	Ministry of Home Affairs Nepal
NGO	Non-governmental organization
NRS	Nepalese rupee
PCVA	Participatory Vulnerability and Capacity Assessment
SCORE	Strengthening capacity of communities for disaster risk reduction through early warning in Nepal
SES	Socio-Ecological System
UN	United Nations
UNDP	United Nations Development Programme
UNISDR	United Nations International Strategy for Disaster Reduction
WIDP	Water Induced Disaster Prevention Division (Nepal)

Glossary

Budhi Kulo	Large irrigation channel flowing through the Rajapur area; it is fed by the Karnali River. The irrigation channel sometimes causes flooding in Shankarpur.
Dalit	Name for a social group of the lowest rank in the Varna system. Dalits are also known as the "untouchables" and face widespread discrimination in the society.
Deheri	Traditional container for keeping grains. A Deheri is usually made of grass, bamboo and mud.
Fitkiri	Traditional medicine that according to local people can be used for water purification.
Kattha	Area unit commonly used for measurement of land in the Terai region, 1 kattha = 339 m^2
Mukta-kamaiya	Name related to people that used to be labourers in a bounded labour system called Kamaiya; the system was abolished in year 2000. The majority of Mukta-kamaiya people have very low socio-economic status.
Murgahawa	One of our two research communities, situated on banks of the Karnali River.
Pahari	Name given to the group of people originally from Himalayan hills, who migrated to the Terai region. Pahari people are not native in our research area, but arrived there in different migration waves.
Shankarpur	One of our two research communities, situated between the Karnali River and Budhi Kulo irrigation channel.
Sonaha	Ethnic minority living in the Rajapur Area. Sonahas are well adapted to live close to the river; their main livelihoods consist of fishing and gold panning.
Sukumbasi	Name for landless people, which are often on the bottom of the Nepali society.
Tharu	The majority ethnic group in the Rajapur Area whose main livelihood is agriculture. Tharus are an indigenous group of plains in Nepal.
Thati	Elevated wooden level built inside a house. Thatis are utilized during floods; people place their essential property on it and also stay there during inundation.
Terai	Another name for the plains in Nepal located just under foothills of Himalaya. Our research area falls in the Terai region.

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1 Introduction

Nepal is frequently affected by natural hazards, including floods, landslides, earthquakes, fires, and avalanches (Pokhrel et al 2009: 478). Our study investigates how people deal with recurrent floods both in the short and long term.

The two research communities, Murgahawa and Shankarpur, lie in the plains, known as the Terai region. More specifically, they are situated in close proximity to India, in the Rajapur area (See Figure 1), which is part of the South-Western Bardiya district. Rajapur is surrounded by two branches of the Karnali River, the largest river in Nepal (Howarth and Lal 2002: 113). Here, floods occur often and hit with high intensity (UNDP 2009: 89). During the monsoon season Karnali can reach a discharge of 21,000 m^3/s, which is nearly hundred times more than in the dry season (based upon Howarth and Lal 2002: 113 and DHM 2012).

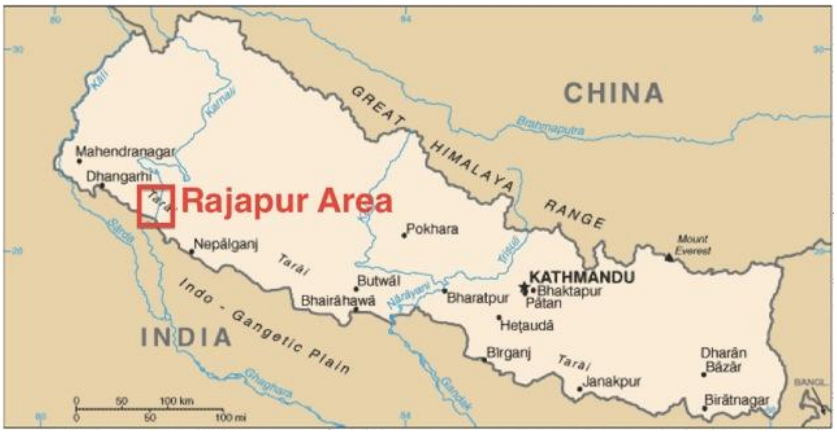

Figure 1: Map of Nepal with demarcation of the Rajapur area
(Source: The World Factbook 2009, edited by Kocanda and Puhakka 2012 - marked with red colour)

The Rajapur area also has one of the largest farmer-managed irrigation systems in Asia: a more than 100 years old irrigation channel called *Budhi Kulo* (Howarth and Lal 2002: 112). Budhi Kulo flows through the middle of the Rajapur area and irrigates more than 8,000 ha of land. The irrigation system is fed from the Karnali River; the amount of water inside the system varies strongly according to the season and location (ibid.). In general, downstream communities face water scarcity during the dry season and get flooded from the irrigation system during the monsoon.

Due to the availability of fertile land and water resources, agricultural production in the Rajapur delta is high compared to the rest of the country. Nevertheless, floods are known to hamper production dramatically (KII A3; KII A5)[1]. Annually, floods in the Terai region affect thousands of people by ruining agricultural production, limiting mobility, destroying infrastructure, killing livestock, and causing other economic losses (Dulal et al 2010: 621).

Nepal has adopted a National Strategy for Disaster Risk Management, which aims for a disaster-resilient country (MOHA 2009: 24). Yet a lack of funds has limited the scale of action (Gautam 2010: 6). People that live in remote communities mostly rely on traditional disaster risk reduction measures that are passed from one generation to another (UNISDR 2008: 30). Studies about indigenous knowledge in Nepal are still scarce but it is argued that this traditional wisdom blended together with modern scientific knowledge would strengthen communities´ resilience to disasters (ibid: 33).

1.1 Purpose and research questions

Local knowledge is often disregarded in disaster risk management because of lack of data, especially in developing countries (Cutter et al 2012: 295). It is the aim of our research to fill a small part of this knowledge gap. We hope the findings of the study will be beneficial to future flood risk reduction actions in the research area. Although our findings are not generalizable to different populations, they can contribute to the discussion of adaptive capacity, the central concept of our study.

Adaptive capacity refers to "*capacity of actors to respond to, create, and shape variability and change in the state of the system*" (Chapin et al 2009: 23). We analyse the response spectrum of communities; what kind of strategies people use to adapt to, cope with and recover from floods. Going beyond describing the actions, we investigate how access to resources and social learning steer these processes. Ultimately, we aim to identify social factors that hinder the adaptive capacity of individuals and communities as a whole.

[1] Abbreviation KII is used for Key Informant Interview, complete list of the interviews is in *Enclosure 1*.

Research question:

What kind of social factors hinder people´s adaptive capacity to floods in the Rajapur area, Nepal?

Sub-questions:

How do people adapt to, cope with and recover from the impact of floods?

How does access to resources and social learning steer these activities?

Although communities are our units of analysis, we do not assume them to be places of coherence or harmony. As Cannon (2008: 12) highlights in his discussion on community resilience: "*Communities are places where normal everyday inequality, exploitation, oppression and maliciousness are woven into the fabric of relationships.*" Pasteur (2011: 14) notes the coping strategies are based on skills and resources available. On the other hand social relations and structural features of a society define people's choices and their impact (Cutter et al 2012: 308). In our analysis we aim to identify underlying social factors that set boundaries to adaptive capacity.

1.2 The research frontier

The determinants of adaptive capacity are related to the level at which one analyses it; we focus on the local level, where we analyse the adaptive capacity of individual households, but also the collective capacity of certain social groups and communities.

Our research communities represent complex Social-Ecological Systems (SES); the residents of the villages are dependent on resources and services from the ecosystem, and are affected by natural hazards such as floods. On the other hand, the activities of the residents have an impact on the ecosystem dynamics (Chapin et al 2009). Although we recognize the interactive relationship between humans and nature, it is out of the scope of our research to analyse these dynamics in depth. Similarly, the macro-level social, economic and political processes that influence adaptive capacity (Smit and Wandel 2006: 289) are not focused on in this study.

1.3 Disposition

This chapter has briefly introduced the background of the study, research questions and purpose. Next chapter describes our methodological choices and their limitations, and is followed by a contextual description of the study units. Thereafter we present the theoretical framework and analytical model that is then employed in the chapter of findings. Finally, we summarize the main findings and discuss them in relation to previous research, conclude and make suggestions for further research.

2 Methods and selection

In this chapter we describe the methodology that the study employs and critically reflect upon its different limitations. We begin with explanation of the study design and thereafter go into details of data selection, collection and analysis.

2.1 Design of the study

Our study has a qualitative and flexible design; rather than following a fixed design, essential parts of the study, such as the research question, were modified during the process (Robson 2011: 131). Our research questions could not be answered by focusing only on subjective or objective realms. Therefore, we analyse both social structures and human agency, which interact with each other. In our research, *agency* is the capacity of individuals to act, whereas *structures* are the underlying patterns that limit their choices.

Recognizing the context-bound nature of knowledge, we employ the epistemological standpoint of relativism (Jupp 2006: 93). Accordingly, the ontological position this study follows is constructionism, noting that social phenomena are both produced through social interaction and constantly revised (Bryman 2008: 19). We also acknowledge the cultural biases we carry with us as researchers, being prone to interpret our research problem according to the standards of our own cultures. Although we have aimed to include an “emic” approach to portray the perspective of our research participants, our study cannot avoid being quite “etic”; we employ theories that are defined by outsiders and are also outsiders ourselves.

As advised for inexperienced researchers, we decided to design the research according to only one tradition of enquiry - a case study approach. An instrumental case study strategy matched with our intention to examine a case in order to provide insight into an issue (Silverman 2010: 139), namely to analyse the limiting factors of adaptive capacity in a specific geographical and social context.

We decided to study multiple villages in the same area; we therefore followed the embedded single-case design as defined by Yin (2009: 46). The villages of Shankarpur and Murgahawa are our units of analysis that have a similar social and geo-ecological profile.

There are previous studies that have looked into limiting factors of adaptation, coping and recovery, albeit in different contexts (e.g. Dulal et al 2010; Jones and Boyd 2011). Previous studies guided our data collection to some extent, and contributed greatly to our analytical model. Consequently, our study is rather more confirmatory than exploratory.

2.2 Data sources

Multiple sources of data were used to provide an in-depth description of our cases and to test the accuracy of our interpretations. In order to increase the credibility of the study we also asked some key informants to review our findings (Bryman 2008: 377). Focus group interviews, household interviews, key informant interviews and direct observations are the primary data sources of our study. In addition we reviewed secondary data sources such as academic publications, and documentation from NGOs, the Nepalese government and UN bodies.

When designing interview guides we were inspired by field manuals for data collection in disaster affected areas (e.g. FAO and ILO 2009; Ibrahim and Ward 2012). Ultimately, the interview guides served as a check list for topics to cover in our semi-structured interviews. They are attached in *Enclosure 2.*

As is typical for a flexible research design, our plans changed along the way, when we reflected on what kind of questions and who we should ask. While conducting the interviews, we came to realize the many challenges of being flexible researchers. We did not understand the local language, thereby use of translators hampered our ability to note the exact words and sense the

mood. Nor were we very knowledgeable about the culture and people´s living conditions, which in turn limited our ability to interpret information, recognize important clues and see contradictions.

Although we coached our interpreters and went through the interview guides together so that they were familiar with our research topic, the disadvantage of receiving almost all of our information second-hand was inevitable. Our interpreters probably left out some information because they either found it irrelevant or were unable to translate it. Under these circumstances, we tried our best to keep open and enquiring minds, and to be open to contradictory findings.

We came to the communities as foreigners, together with representatives of NGOs that had an on-going disaster risk reduction project called SCORE[2] in the area. One of our ethical considerations was to make our role as students, not development aid workers, clear for the respondents, and to explain that their identities will not be disclosed in our study. However, our respondents undoubtedly gave a different picture of their lives to us than for example, they might give to their relatives. Instead of talking about their agency - what they could do with the available resources, they constantly referred to the limiting structures, portraying themselves as victims of floods. Their way of reflecting reality also affected the formulation of our main research question − we decided to concentrate on the limiting social factors.

2.3 Methods of selection

We used purposive sampling in order to find both people and communities that were most relevant to answer our research questions. We knew from the beginning that we had limited resources to collect data. Access to our research communities was logistically demanding and we needed a translator to support us, which limited the time we could spend in the communities. Nevertheless, we did not determine exact number of research communities or interviewees beforehand.

[2] SCORE - abbreviation of *Strengthening capacity of communities for disaster risk reduction through early warning in Nepal*

2.3.1 Research communities

We decided to include communities that had different ethnic compositions and were located in different geographical locations and therefore affected by floods with different intensity and possibly in different ways. Our assumption was that these factors contribute to different flood response strategies, and thus that we would be able to document a diversity of strategies.

Initially, we started to collect data from three communities. During the first field trip, however, we decided to focus on only two, recognizing the trade-off between the number of research communities and the amount of information we could gather from each one. A village that was least affected by the floods due to its location most upstream was left out; our reasoning being that we would get more data about flood response strategies from communities that were regularly affected. Our research communities, Murgahawa and Shankarpur, are described more in detail in the context chapter and in our findings.

2.3.2 Interviewees

We started the field interviews with the Community Disaster Management Committees (CDMCs) that community members themselves had recently formed as part of the SCORE project. Members included both male and female representatives of affected households, and representatives of different ethnic and social groups, as advised by the project staff. We thought that conducting interviews with the CDMC could help us to avoid interviewing a biased sample of individuals that don´t represent the community. Nevertheless, we came to understand that certain power dynamics play a role also in CDMCs. Although females and Dalits, the so-called untouchables, were included, it was mostly the influential male members who spoke up. In order to better include their voices in our study, we conducted group interviews with a Dalit group in Shankarpur and a female group in Murgahawa.

In addition, we conducted interviews with households from different social and ethnic groups in both communities. While choosing the respondent we took into consideration the compositions of the communities, so that both minority and majority groups were included.

We also conducted key informant interviews with both community representatives and outsiders to gain better insight into the local context. We used snowball sampling to find more key informants recommended to us by our interviewees (Bryman 2008: 184). In the communities we interviewed village leaders and SCORE project social mobilizes, with whom we focused on topics such as the history of the communities and the overall impact of floods. Outside of communities we strove to find individuals who had been working with flood response in our research area, and who represented different institutions such as NGOs and government institutions. The complete list of conducted interviews is attached in *Enclosure 1*.

2.4 Data analysis

We took notes during all of our interviews, and audio recorded majority of them. The recordings were used to verify the content of our notes. When transcribing, we found that the content was more important than the exact wording. We also grammatically modified the language of the direct quotes used in the study. We used our primary data both to describe the context of our study units (Chapter 3) and in our findings (Chapter 5).

We strove to have a model of analysis ready before going to the field so that we could systematize the data. However, as it happened, we came to a realization that our model needed to be further developed after the data collection; we were trying to force our data into a model that did not serve well the purpose of answering our research questions. Therefore, we built a new analytical model, based on the concept of adaptive capacity (e.g. Chapin et al 2009) and the access model (Wisner et al 2004). The analytical model is described in chapter 4.4.

We then applied a technique of pattern matching; matching empirical patterns of our research data with theoretical predictions (Yin 2009: 136). The concepts that we had defined in the model of analysis were applied on the interview transcripts as categories and codes. Our findings were then organized according to the categories and codes, and analysed in relation to predicted patterns.

As we had a big amount of data and we were two people doing the coding, we decided to use a web based application called *Dedoose* to facilitate and speed up the process, and to increase the transparency of performed procedures. Use of supporting software naturally did not mean that the

program did all the thinking for us. We were the ones to ponder how to address topics that fell under several different codes, how to portray different patterns; in other words, how to pull the analysis together.

3 Context of study units

This chapter describes the context of the study, including different ethnic and social groups in the research area, their main livelihoods and the impact of floods. We hope that this rather detailed description sets the scene for our analysis and also enables others to judge possible transferability of our findings to a different context (Bryman 2008: 378).

3.1 Different ethnic and social groups

Murgahawa has total a population of 703 people. It consists of 103 households, of which the majority (96%) are so called ethnic households. Of those, approximately one half belong to the *Sonaha* group, the other half are *Tharus*. There are also two *Dalit* households and two households with people of other ethnicity (SCORE 2011a). The community is situated by the western bank of the Karnali River (see Figure 2). Karnali River poses the main flood risk for Murgahawa.

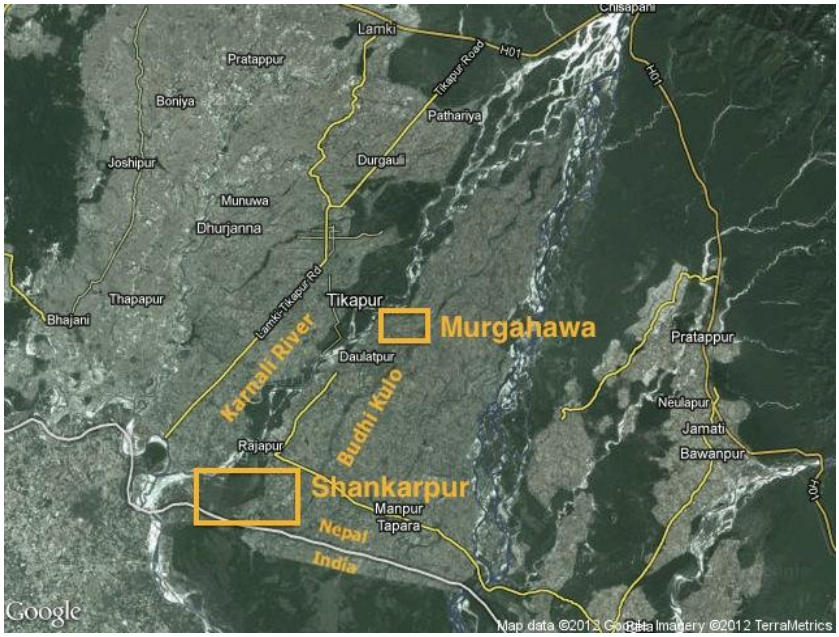

Figure 2: Map of Rajapur Area with demarcation of Murgahawa and Shankarpur (Google Maps 2012 - edited by Kocanda and Puhakka 2012 - marked with yellow colour)

Shankarpur is more than double the size of Murgahawa with a population of 1,681. Out of its 253 households 40% are Tharu, 25% Dalits, and 35% are classified as others; the majority of them are *Paharis*, migrants from the hills (SCORE 2011a.). Shankarpur is situated between the Karnali River and Budhi Kulo (see Figure 2); both the river and the channel pose a flood risk to Shankarpur. It is the most downstream community on Nepali part of the river.

Inside the communities, people who live in close proximity of each other often have similar origin or social status. We briefly describe the different groups, since we recognized that ethnicity and social status play central role in people's lives.

3.1.1 Tharus and Paharis

More than 50 different social and ethnic groups live in the Rajapur area (Chhetri 2005: 27). There are however two dominant groups: Tharus, the main indigenous group in the area, and Paharis, migrants from hill areas (Conway et al 2000: 221). The Rajapur area has the highest proportion of Tharu people in the whole country; almost 70% of the population (CBS 2002 cited in Chhetri 2005: 27). Traditionally Tharu people are dependent on agriculture for their livelihoods; according to various socio-economic indicators[3] they are relatively disadvantaged compared to non-Tharus (ibid.).

The migration of Paharis into the Bardiya district has a long history but it accelerated radically in 1960's and resulted in three main migration phases. The migration waves were both spontaneous and systematic, driven by government resettlement policies (Conway et al 2000: 228). The common feature for the migration was a search for more land (ibid: 231). The Paharis populated areas that were already populated, but also unpopulated densely forested areas, contributing thereby to rapid deforestation in the area (ibid: 225).

Competition over scarce natural resources caused tension with the indigenous Tharus (ibid: 229). On this aspect, Chhetri (2005: 31) states that the in-migrating Paharis and other elite groups gradually aliened the Tharu population from their land, turning many of them landless. Currently the minority Paharis are in control of most land and resources in Western Terai (ibid: 28).

[3] Indicators such as literacy rate and labour force participation (Chhetri 2005: 25)

Besides the two main population groups, there are some other ethnic and social groups that deserve attention in our research: *Dalits*, *Mukta-kamaiyas* and *Sonahas*. We also reflect upon position of women in the Nepalese society.

3.1.2 Dalits

Dalits are known as the "untouchables", the lowest rank in the Varna system. Officially the Varna system was outlawed already by the Civil Code 1963/64 (Jones and Boyd 2011: 1266). However, open discrimination towards Dalits persists, especially in rural areas where the social system still follows the ancient order (ibid.). Jones and Boyd (2011: 1270) identified in their study of social barriers for adaptation in Western Nepal that Dalits "*lack access to spaces of political power and representation at the community level*", are "*restricted in access and rights to natural resources*", and "*lack equal access to financial loans and assistance from higher caste during times of need*". In Rajapur approximately 7% of the population are Dalits (CBS 2002 cited in Chhetri 2005: 28).

3.1.3 Mukta-kamaiya

The Mukta-Kamaiyas are former Kamaiya labourers who were bonded to the landlords with high interest rate debts (Chhetri 2005: 37). The Kamaiya system was a traditional organization of bonded labour practiced in Western Terai. It was originally practiced in the Tharu culture, however even non-Tharu labourers[4] were found in the Terai region (ibid: 33). Chhetri (2005: 38) discusses how originally, the Kamaiya system was mutually beneficial for both the farmer and the labourer: the farmer was provided with labour and the labourers secured access to food in a form of shares from agriculture production. As the society changed and mostly Pahari landlords emerged, the Kamaiya system was transformed into a highly exploitative system.

The Kamaiya system was abolished in year 2000 involving cancellation of all the debts. As a result of this government decision, the ex-Kamaiya labourers, Mukta-Kamaiyas, were expelled from their living quarters. In Rajapur the government provided the families with 2-4 *kattha*[5] of land that was located next to the riverbanks or forests, in other words very hazardous areas (KII A1). Families cannot produce enough food for their needs from the land they got, and they lack

[4] Approximately 85% of Kamaiya labour in the Bardiya district were of Tharu ethnicity; 15% were non-Tharu.

[5] Local area measurement unit - 1 kattha = 339 m^2

opportunities for alternative livelihoods. In many cases, the uneducated and resource-poor Mukta-Kamaiyas have ended up being more vulnerable than when they were living under landlords (Chhetri 2005: 39).

3.1.4 Sonahas

One of the ethnic minorities living in the Rajapur area is called Sonaha. The group has an estimated total population of around 1 200 (The Himalayan Times 2011). The name Sonaha is derived from a Hindi word for gold - *Sona*; this reflects one of the main livelihoods of the group, gold panning. Traditionally Sonahas live by the river, and apart from gold panning, their other main occupation is fishing (GNI undated). In contrast to the vast majority of inhabitants in Rajapur delta, Sonaha people don't cultivate paddy; they predominantly buy all their food. Traditionally, the group has a low social status (ibid.).

3.1.5 Position of women

Most of the households in our study area are extended families. Married women tend to join the husbands´ household; the position that the young wife has inside the household is often defined by the amount of dowry (Pant and Standing 2011: 415). Although the gender roles are changing, Nepali women continue to be "second-class citizens" (ibid.). In the mainly patriarchal society women have lower access to education than men and their decision-making power is limited within households; men also dominate the public decision making (UNDP 2009: 31).

3.2 Livelihoods in the communities

Agriculture is the main livelihood in both villages. Rice is the main crop and is grown during the monsoon season; in addition people grow lentils, wheat, maize, mustard and vegetables. Households keep hens, goats and pigs, and better off ones may keep cattle that are used as draft animals in the fields and for transportation.

If agricultural land were equally divided between households, in Shankarpur an average household would own 22 kattha while in Murgahawa the figure would be 8 kattha[6]. The distribution of land is highly skewed in Shankarpur; some landlords own up to 1 000 kattha while

[6] Those figures are calculated from beneficiary data collected from the document SCORE (2011a).

Dalits and Mukta-kamaiyas own up to 4 kattha per household. The majority of households own between 5 and 80 kattha (KII A1; FGI S1).

In Murgahawa, nearly half of the population, the group of Sonahas, tend to have very small landholdings, 1 or 2 kattha. Instead of agriculture their main livelihoods are gold panning and fishing. The distribution of land is less skewed than in Shankarpur; the maximum land holding per household is 200 kattha (KII A1).

In both communities, small-scale farmers practice so called sharecropping. They cultivate a certain area on a landowner´s land and receive 50% of the production as compensation (KII A1). Another common livelihood in the area is wage labour, which usually means temporary work in other people's fields on daily basis. Job opportunities in the Rajapur area are scarce since it is industrially underdeveloped; therefore the practice of temporary migration to India and bigger Nepali cities is widespread. Many people migrate during the agricultural low-season in between the paddy planting and harvesting in the monsoon season, or during the winter months (SCORE 2011b).

We observed that in Shankarpur it is common to collect firewood and sell it in the local market. Almost all women from the village, regardless of social and ethnic affiliation, are engaged in this activity during the winter months (SCORE 2011b). They go to the forest on the Indian side of the border; agreements are made with the forest rangers to collect firewood in exchange for labour-intensive work in the forest, or access is bought with “rice-bribes”. Sometimes people access the forest without permission and risk having to pay a high fee to the guards (FGI S1, FGI S2).

3.3 The impact of floods

Residents of both communities have ranked floods as the most serious natural hazard[7]. Murgahawa gets flooded from the Karnali River, while Shankarpur can get flooded both from both the Karnali River and Budhi Kulo. The communities are affected by the floods during the monsoon season starting from May-June until September-October (SCORE 2011b; SCORE

[7] Hazard ranking was done as a part of Participatory Vulnerability and Capacity Assessment (PVCA) as a part of SCORE project

2011c); inundation can last up to 3 days, and might occur several times during the monsoon season (FGI S1, FGI M1).

The first major flood that a village elder from Murgahawa remembers hit the Rajapur area in 1952. At that time one entire village in the area was swept away and Budhi Kulo widened. The next major flood hit in 1983; there were human casualties, the majority of livestock died and an epidemic plagued the area in the flood's aftermath (SCORE 2011c, FGI S1). People in Shankarpur and Murgahawa remember how their houses, livestock and belongings were swept away. "*Everything went to India*", as one woman from Shankarpur describes. Moreover, residents of Shankarpur describe that since 1983 Budhi Kulo has been widening and changing location – moving closer to their settlements.

A recent flood of 2009 affected Murgahawa strongly. Almost the whole community was inundated; houses, standing crops and grain storage were badly damaged (SCORE 2011c, FGI M2). Shankarpur was not similarly affected. Nevertheless, moderate floods have an impact too; in Murgahawa an average of nine Sonaha households get flooded annually (KII M1) while in Shankarpur dozens of households have been affected annually during recent years (KII S1).

Figure 3: Paddies of this rice field had to be replanted after inundation from Budhi Kulo.
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The rice that is produced during the monsoon season is the most important part of the yearly agricultural production; floods can damage the crops or destroy the whole yield (see Figure 3).

Agricultural production is also hampered by land cuttings and sedimentation of sand in the fields (FGI M1, S1). In Murgahawa the community forests that are placed close to the river are gradually destroyed by land erosion and consequently people's access to natural resources such as wood and grass has decreased (FGI M1).

However, there are some positive impacts of flooding. Minor floods can benefit agricultural production, and sometimes fertile silt is deposited in the fields. Floods also bring more fish and sediment that contains gold particles (HHI M1). As one Sonaha man comments, they sometimes get enthusiastic once the water level gets lower: "*There must be more gold, let's go and search for gold!*"

4 Search for theoretical understanding

This chapter describes the theoretical base of our study, and further explains how we employ the central concepts in the model of analysis.

Several concepts and theories have contributed to our study. We started off with the concepts of resilience and vulnerability, often used in research of disaster risk reduction (e.g. Wisner et al 2004; Cannon 2008; Gaillard 2010; Twigg 2009). Further on, research on sustainable livelihoods (e.g. Scoones 1998&2009; DFID 1999) added to our knowledge of livelihoods and disasters. Finally, we chose to use the approach of Social-Ecological Systems, which binds together several concepts that are relevant for our study and also provides a theory to understand the complex relations of human behaviour and ecosystem dynamics (e.g. Walker et al 2004; Chapin et al 2009). Our focus is on the adaptive capacity, as described below. In order to portray the underlying social factors of adaptive capacity, our framework also includes the access model defined by Wisner et al (2004).

4.1 Adaptive Capacity

SES is an interdisciplinary framework that combines concepts of natural and social sciences, in order to understand current and future changes in the Earth System (Chapin et al 2009: 6). The interdisciplinary approach is needed as the changes are neither entirely physical, ecological nor social (ibid). Four approaches that lead towards sustainable systems are identified and described within the framework: reduced *vulnerability*, increased *resilience*, enhanced *adaptive capacity*,

and enhanced *transformability* (ibid: 20). These interrelated features determine the future course of SESs (Walker et al 2004); our study focuses on adaptive capacity.

In order to have a good understanding of adaptive capacity one needs to know what is resilience:

"the capacity of a social–ecological system to absorb a spectrum of shocks or perturbations and to sustain and develop its fundamental function, structure, identity, and feedbacks through either recovery or reorganization in a new context."

Chapin et al (2009: 24)

This definition differs from others (e.g. Twigg 2009) by not just seeing resilience as an attribute of a system to maintain and recover its basic functions, but extending it to a capacity to reorganize in a new context. The other side of the coin for resilience is vulnerability: *"the degree to which a system is likely to experience harm due to exposure to a specified hazard or stress"* (Chapin et al 2009: 22).

According to Chapin et al (2009: 21) adaptive capacity resonates with both resilience and vulnerability. It is *"the capacity of actors, both individuals and groups, to respond to, create, and shape variability and change in the state of the system"*. Adaptive capacity highlights human agency whereas resilience and vulnerability operate in systems level. This somewhat narrower focus served well our research purpose. The main features of adaptive capacity are:

"(1) biological, economic, and cultural diversity that provides the building blocks for adjusting to change; (2) the capacity of individuals and groups to learn how their system works and how and why it is changing; (3) experimentation and innovation to test that understanding; and (4) capacity to govern effectively by selecting, communicating, and implementing appropriate solutions"

Chapin et al (2009: 23).

We concentrate to analyse the feature number 1 which we call "access to resources" and number 2 which we call "social learning". Both of these in turn influence to the remaining features, the capacity of people to innovate and to implement solutions. These concepts are explained more in detail in the following sections.

4.1.1 Access to resources

Diversity and availability of resources in a form of material assets but also skills and social assets are the building stones of adaptive capacity (Ensor and Berger 2009: 18). When we talk about resources we refer to different kinds of capital: human capital such as skills and knowledge; social capital such as networks and institutions; physical capital such as infrastructure and equipment; financial capital such as savings and credit; natural capital such as soil, flora and fauna (Scoones 1998; DFID 1999).

Access to resources is determined, to a high degree, by local institutional rules and behavioural norms (Cutter et al 2012: 314). Disempowered ethnic and social groups within community, and also women and children usually have access to fewer resources, which thereby makes them more vulnerable to hazards and stresses (Kofinas and Chapin 2009: 65). In order to analyse the issues of access more in-depth, we employ the access model by Wisner et al (2004). But first, the concept of social learning needs to be defined.

4.1.2 Social Learning

Social learning relates to both human and social capital; it is learning within and between social groups (Lebel et al 2010: 334). It is an essential characteristic of a system that is capable to adjust and reorganize in the new context and thereby a basic element of adaptive capacity. Social learning provides knowledge and understanding on how to either replicate or innovate different response strategies. Combined with adequate access to other resources, this process leads further to diversification, which manifests a step from short-term coping into long-term resilience and adaptation (Kofinas and Chapin 2009). If the adaptive strategies are successful, fewer resources are needed for coping and recovery, which leads to increased community resilience (Lavell et al 2012: 52).

When we discuss social learning, we refer to learning to deal and live with floods; learning originating both from scientific and indigenous knowledge. Indigenous knowledge has its origin in past experiences and in understanding the local environment; it is represented by specific practices, traditions and institutions (Kelman et al 2012: 13). The knowledge is an important resource in response to floods; however instead of being a collective community resource, it is

often unequally distributed amongst the population (Maheu 2012: 202). Kelman et al (2012: 19) state that different sub-groups and different genders within a community possess various sets of and access to indigenous knowledge and thereby have different coping strategies. Again, it is in our interest to analyse the social factors that limit the process of social learning. For that purpose we employ the access model which is described below.

4.2 The Access Model

The ´access model´ (Wisner et al 2004) describes why disasters hit some harder than others. Access to resources determines the ability of individuals, groups or communities to secure livelihoods and, when necessary, to adapt. Access, in turn, is:

"always based on social and economic relations, including the social relations of production, gender, ethnicity, status and age, meaning that rights and obligations are not distributed equally among all people"

(Wisner et al 2004: 85).

The model tracks down the root causes of vulnerability to two related systems of political economy. Firstly, *social relations* refer to the processes of how people, whose access to resources varies, exchange resources amongst each other (ibid). Non-monetary social relations relate to support and networking within and between households, social groups or whole communities (ibid: 88).

Secondly, the *structures of domination* are about the politics of relations among individuals and groups. They exist within households, between economically defined classes, and between different ethnic groups. They *"shape, and are shaped by, existing rights, obligations and expectations"* (ibid: 85). They determine social protection against hazards, such as mutual support within a community or support from the government or other institutions (Wisner et al: 88). Furthermore, individual capacity to deal with hazards is affected by particular structures such as gender roles and rules of interaction between certain classes and groups (ibid: 92). These rules and norms are in turn based on *"dominant and shared ideologies, world views and beliefs"* (ibid: 86). Nevertheless, it is important to note that the rules of the game are not set in stone; during extreme situations the structures of domination can change quickly (ibid: 92).

In our analysis we recognize the influence of both of these systems on adaptive capacity. However, we see that these concepts are overlapping with each other. We don´t differentiate between social relations and structures of domination in detail, instead we refer to *social and power relations*.

One of the limitations of the access model, as authors themselves reflect, is that it puts little focus on abstract assets such as creativity and innovation (ibid: 97). However, in our model of analysis we combine the concepts of social learning and access to resources, bringing forward a wider framework. Before presenting the analytical model as a whole, we describe what we call *the cycle of response strategies*.

4.3 The cycle of response strategies

We frame our findings according to a cycle of response strategies that people take in the environment of recurrent floods. We describe the different stages in the response cycle as: adaptive strategies, immediate coping with the flood impacts and recovery strategies after the flood. Adaptive strategies are both anticipatory and reactive, as we describe below.

We analyse what kind of anticipatory adaptation takes place in our research communities. People that live in a flood prone area aim to reduce exposure and vulnerability to hazards through activities such as adopting more hazard-resilient building codes, securing their livelihoods by diversification, or establishing functional Early Warning systems (Cardona and Carreno 2011). The immediate coping is thereby directly dependent on anticipative actions prior to the hazard (Lavell et al 2012: 74). When we talk about immediate coping we mean rather short-term practices that households and groups in the communities perform during the floods (Kofinas and Chapin 2009: 67). We analyse different strategies related to saving lives, ensuring basic needs and protecting property.

In the section of recovery strategies we analyse how people put their lives back together after a flood. People habitually choose to recover to the same state as they were in before the flood hit, despite the fact that this does not decrease the impact of the next flood, which could be even more destructive (Lavell et al 2012: 75). Nevertheless, the recovery stage also poses an opportunity to adapt both the infrastructure and behavioural patterns, which leads to reactive adaptation.

4.4 The analytical model

In our analytical model we incorporate concepts defined in our theoretical framework. We focus on two key features of adaptive capacity - access to resources and social learning. Additionally we use the access model as an important tool to uncover social and power relations within those two features. Although the access model describes social and power relations as the underlying factors of vulnerability, we see that they can equally be portrayed as hindering factors of adaptive capacity. All these concepts form our analytical model, which we apply to the cycle of response strategies (see Figure 4).

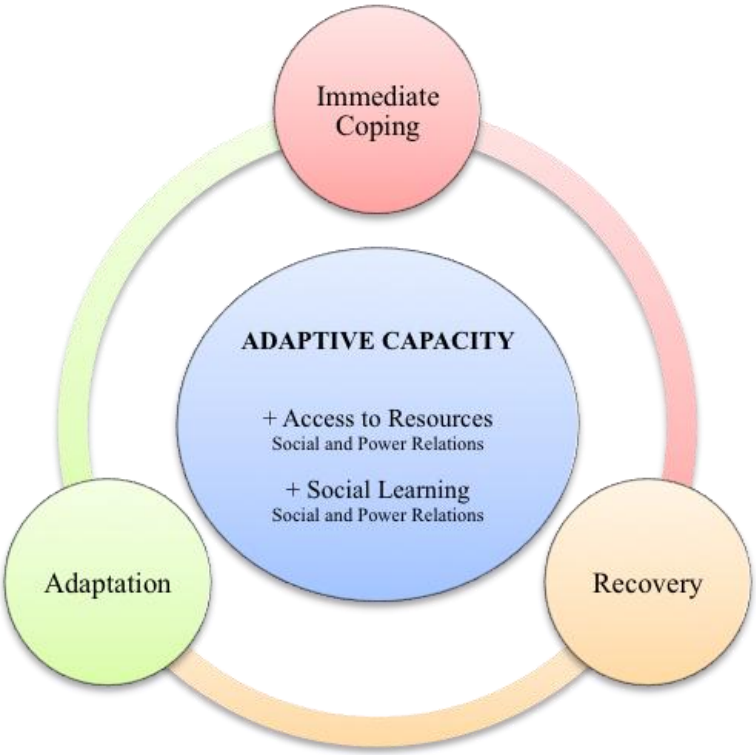

Figure 4: Model of analysis.

The outer circle portrays the repetitive cycle of adaptation, coping and recovery. The main characteristics of adaptive capacity - access to resources and social learning - steer the process and are therefore placed in the centre. These features are investigated yet on another level to identify underlying social and power relations, which pose limitations to the adaptive capacity.

5 Findings

In this chapter we analyse our empirical data according to the analytical model that was defined above. Our findings are divided into three chapters: adaptation, coping and recovery. In each chapter we describe what kind of strategies people employ. We analyse their adaptive capacity from two perspectives, access to resources and social learning. In order to answer to our main research question we identify social factors that set limitations for individuals and communities as a whole.

5.1 Adaptation

In this sub-chapter we describe the adaptive actions people have taken to survive and prosper in the flood prone area. The sections deal with changing building codes, adapting livelihoods, and adaptation through collective action. We analyse how access to resources and social learning influence these activities, and attempt to identify the underlying social factors that hinder these processes.

5.1.1 Changing building codes

One strategy that people in our research area use to decrease the impact of floods is to build their houses more resistant to floods. The traditional houses in the Rajapur area are one-storey buildings built with locally available materials. Walls are built from wood, bamboo and soil (rich in clay) mixed with cattle dung; the roof is usually constructed from wood and thatch (see Figure 5).

Figure 5: Traditional houses with elevated plinth levels © Jakub Kocanda

The traditional houses are easily damaged during the floods; if the walls get inundated, soil and dung get washed away. Houses usually have to be repaired each year after the monsoon season. During major floods the whole house can be destroyed. In both Shankarpur and Murgahawa people have started to do diverse structural enhancements to make their houses more flood resistant. They also build elevated hand pumps to secure access to drinking water, and elevated animal sheds to provide safe shelter for their animals.

Building with natural capital

The wealthy households in both communities build their houses with modern, durable materials such as bricks, concrete and tin (for the roofs); those materials are notably more resistant to water damage. However, most families cannot afford these expensive building materials; instead they employ other strategies to increase the water resistance.

One very common strategy that most of the houses employ is raising up the plinth level, the foundation of the house (see Figure 5). A relatively well-off Pahari man in Shankarpur reported that his family built a house with raised plinth after the 1983 flood, when their previous house was destroyed. Water has not entered the new house but this is also due to the fact that the house is situated in relatively high land, and that Shankarpur has not experienced a major flood after 1983.

Raising a plinth level requires resources; mostly soil. In discussion with Mukta-kamaiya women in Shankarpur we were told that they cannot build higher plinths because there is no suitable soil available in their own, small landholdings. In order to bring soil to their house they would have to hire a bull cart, but they lack the financial resources to do so.

Another common practice in both communities is to build a *Thati*, an elevated wooden level inside the houses. The main purpose of Thatis is to provide a safe place for both people and property during the floods. Thatis vary in height and area; the higher and larger they are, the better protection they can provide.

The main building material for Thati is wood. During our field visits we recognized that households have very different access to wood, due to several factors. The main legal channel to

get wood and timber is through a membership in a community forest user group. In Shankarpur there is only one community forest, while in Murgahawa there are several. Those who are members can access the natural capital inside the forest.

In theory every household inside the community can become a member. In practice this is not the case. A group of Dalits reported that they have been excluded from the forest in Shankarpur. The Dalit households have been asked to contribute a much higher entry fee than that is charged from the others. The amount is beyond their capacity to pay. Interestingly, shortly after having talked to the Dalit group, we were approached by the chairman of the community forest who told us that we had been talking with the *'wrong'* people. He did not want to specify what exactly he meant, but his statement certainly enforced our impression of structural discrimination towards Dalits. As a result of their low position in the social hierarchy, Dalits have more limited access to forest resources than others. This in turn restricts their capacity to build protective structures, and to perform other activities that require natural capital.

Nevertheless, Dalits are not the only ones who have difficulties in accessing wood. "*The trees in the community forest are too young to be cut*", describes a Tharu man living in Murgahawa. Even though the man works as a carpenter in addition to his farming, he is unable to build a Thati in his own house. According to him, the cost of buying wood is too high. Lack of financial capital to purchase building materials seems to be a limitation for most of the households in the area.

Learning from Sonahas

Apart from access to construction materials, inspiration, knowledge and skills are required to change the building codes. When analysing these aspects of social learning, we focus more specifically on practice of building Thatis and two-storey houses.

In general, people in both communities seem to have the knowledge and skills how to build Thatis. As people explain, Thatis are built according to the highest water level from previous floods. According to several community members, they became a common practice after the destructive flood of 1983.

How did it happen that people started to build these levels? In Murgahawa, the ethnic group of Sonahas has a long tradition of living in flood prone areas next to the river. Traditionally, a Sonaha house is a two-storey building. The second floor of the house is protected from the floods; in case of inundation the whole family moves upstairs and continues with their daily activities relatively undisturbed.

It seems that people in the area observed the practices of Sonahas and were inspired by them. A village elder who migrated from the hills to Murgahawa as a child tells: *"We always saw how Sonahas make a two-storey house, we saw their ancestors. When we saw that we also started to make high platforms inside our houses."* However, other ethnic groups have been quite slow to adopt Sonaha traditions. This might be due to many reasons, such as limited access to natural and financial capital, but other explanations are also possible.

Nowadays, approximately half of the households in Murgahawa belong to Sonaha ethnicity. However, most of them moved to the village rather recently. A Sonaha man told how their group (approximately 15 families) used to live in an isolated location on the bank of the Karnali River, where they practiced their traditional livelihoods - gold panning and fishing. They were called S*ukumbasi* – landless people who had nothing of their own. With help from a benefactor who sold them small landholding with favourable terms, they moved to Murgahawa.

When Sonaha families moved to the village, many of them adopted the custom of Tharus to build only one-storey houses. They abandoned their own traditions, although still living close to the river. In the 2009 flood, the majority of these houses suffered severe damage. One wonders why Sonahas who are considered as "*the river people*" took this step away from their own traditions. Perhaps they mistakenly estimated that the flood risk was lower in the new location, and wanted to build houses that demanded fewer resources. But we believe that one motivation was a desire to fit into the community. When they moved into Murgahawa their social status was low. "*Tharus thought they were better than Sonahas*", describes an NGO worker with long experience from the area.

However, during the recent years, the interaction between the different groups has increased and old inimical attitudes have diminished. One indication is the current possibility of Sonaha and Tharu intermarriage, something which was quite unthinkable before, according to the NGO worker.

After the destructive 2009 flood, the Sonaha group made a decision to return to their traditions; whoever builds a new house now makes a second floor (see Figure 6). Sonahas have been reassured about their practices; a Sonaha woman tells us that she hopes that the other community members would also start to build two-storey houses "*so that they and their belongings would be safe*". Recently, one Tharu neighbour living next to Sonahas has built a two-storey house. Other examples of how others have learned from Sonahas are presented in the following sections.

Figure 6: A two-storey house under construction in Sonaha neighbourhood in Murgahawa
© Kati Puhakka

Conclusion – Remaining and changing structures

We identified in this section several factors that hinder the adaptation of more resistant building codes. The majority of people are depended on access to natural capital since they cannot afford to buy flood resistant building materials. In the case of Dalits, structural discrimination impedes them from accessing the resources of the community forest. We believe that the hierarchical relations between different groups have also slowed down the process of social learning. Yet, we

saw that in Murgahawa the old attitudes are changing. Sonahas have returned to their own traditions and others are increasingly learning from them.

5.1.2 Adapting livelihoods

Going beyond the adaptations related to changing building codes, we investigate livelihood adaptations. We described the relatively small diversity of people's livelihoods earlier in the context chapter. In this section we analyse how people diversify their agricultural practices and other livelihoods in order to make a living in the flood prone area and possibly even prosper.

Diversification of agriculture

Agriculture remains the main livelihood option in the area. As we described earlier in the context, people are dependent on the success of paddy cultivation, which is vulnerable to floods. We asked if there are any alternative crops that people could grow, crops that are better adapted to floods. In Shankarpur people answered: "*There is nothing we can do, no maize, no alternative to paddy*", because the severe inundation and strong stream could destroy any crop.

Nevertheless, in discussion with a NGO worker we were told that people in the area are experimenting with cultivation of new vegetables in the dry season. If successful, vegetables can be sold in the market for a relatively good price. The NGO worker however noted that people know little about growing vegetables and often fail, which worsens their economic status. The agricultural extension services, provided by the state, do not reach the remote communities. Although the farmers, in theory, are entitled to these services, they are not powerful enough to demand them from the state or the municipality.

Access to irrigation facilities during the dry season is another challenge; in Shankarpur, the same irrigation channel that floods during monsoon season, does not provide irrigation water during the dry season. There are many households that can´t afford to build wells for irrigation purposes. They therefore have few options to practice cultivation outside the monsoon season.

Even in a good season, there are large differences in who benefits from agricultural production. While the landlords make good profit, majority of the households just manage. For marginalized groups such as Dalits and Mukta-kamaiya it is extremely difficult to profit from agriculture: they have little or no land of their own, and they seldom receive an opportunity for sharecropping

because they lack agricultural equipment and thereby efficiency; landlords prefer to make sharecropping contracts with more resourceful Tharu people who tend to deliver a high yield.

Alternatives for agriculture

During group interviews people acknowledged that in the future agriculture cannot provide for everyone. Already now there are households in both communities that own too little land to sustain them; they need to look for alternatives such as wage labour in order to manage. There are, however, very few off-farm employment opportunities in the area for both skilled and unskilled labour, due to more high-level economic structures. This result in a situation where marginalized households have little say about the terms of work such as salary level; the landlords always have a pool of willing labour when needed. Even less marginalized households such as Tharus who tend to do sharecropping, complain that they have constant insecurity about the future; the landlord may continue to contract them, but could find someone else to cultivate their fields.

Figure 7: Sonahas sell the gold they find and use the income for their daily needs.

© Kati Puhakka

The livelihoods of Sonahas are relatively well adapted to the local conditions (see Figure 7); floods bring more benefit than harm for fishing and gold panning. Within the Sonaha group itself some are satisfied with their current livelihoods, but others would like to shift to other, less

physically demanding professions. However, similarly to other groups, Sonaha lack skills and financial capital to diversify their current livelihoods.

On the other hand, some Tharus in Murgahawa have recently purchased boats and started to adopt the livelihoods of Sonahas. Nevertheless, fishing and gold panning cannot provide a livelihood for the whole population; the increasing population also puts higher stress on the limited natural capital. It can be therefore questioned how long the Sonahas can get by with their traditional livelihoods. In Shankarpur, only some Tharus fish in the Karnali River as a side occupation, since there are very few fish available in the down-stream section of Karnali River and none in Budhi Kulo.

Due to lack of local opportunities, temporary migration is one of the few options to earn money. It is more common in Shankarpur than in Murgahawa since Sonahas survive with their traditional livelihoods. Migration helps the families to make the ends meet but has also negative sides. In Shankarpur, one Tharu woman told how her son died in an accident while working in India; leaving behind a wife and a new-born baby. A Dalit woman from the same village became single mother of three when her husband died to AIDS; she has the same virus which the husband apparently got while working in India.

Most people don't consider permanent migration from the area a proper option since it would involve starting from scratch with no support in a new location. A landlord from Shankarpur, whose children study and hopefully get a good income in the future, hopes that one day the whole family will shift to a safer place. He says however that now "*we have everything here, our house is here, our land is here, how can we go and live in another place?"* For poorer households this option seems even more out of reach.

Conclusion – Livelihoods tied to the land and river

In this section we presented the crucial role that access to land has for livelihood adaptation. Those who don´t own enough land are dependent on the relation to landlords; labourers have very weak bargaining power because of lack of other livelihood opportunities. Small-scale farmers also lack financial capital to build irrigation facilities, and the knowledge to diversify their production. It seems that they don't have enough power as citizens to demand agricultural

extension services to be provided in their villages. Temporary migration with its positive and negative aspects remains the main alternative for the majority. Due to their traditional skills, Sonahas manage to prosper with livelihoods that are not tied to land ownership. However, the natural capital they depend on might deplete in the future, meaning that they will also need to find new options.

5.1.3 Adaptation through collective action

Besides adaptation at the household level we are interested in collective action. In this section we analyse collective adaptation where people use common resources in attempt to achieve larger scale and more sustainable results.

Trial and error

A general belief in both Murgahawa and Shankarpur is that building durable embankments along the Karnali River and Budhi Kulo would decrease the impact of floods. A government agency called the Water Induced Disaster Prevention Division (WIDP) has constructed a few spurs and dikes along the most vulnerable riverbanks of the Karnali River in Murgahawa. Even though this provides some protection, WIDP does not have enough resources to scale up their work. No embankments were built along Budhi Kulo since WIDP lacks the mandate to construct along irrigation channels.

When built without sufficient knowledge of the dynamics of the river, embankments might protect one location but cause harm in another. A poorly-designed embankment, which was recently built on the other side of the Karnali River, diverted the stream towards a village in the Rajapur area, causing destruction. Still, people see embankments as a solution, and have tried to build some themselves. During the last monsoon season, a local landowner in Shankarpur constructed a dyke from bamboo and branches along the banks of Budhi Kulo in order to protect his land. With help from his neighbours he managed to protect his land from erosion, yet his fields got inundated anyway. One NGO representative told that he has seen examples of similar structures which did not last very long because of weak structural properties and poor maintenance. Even though the effectiveness of the embankment is questionable, the landowner showed adaptive capacity to gather resources and build this mitigation measure − the majority of people cannot afford such an experiment.

Collective initiatives are emerging at the local level, due to lack of government interventions. One of them is the *Struggle Committee*, which consists of representatives from all communities within Bhimapur Village Development Committee, of which Shankarpur is a part. A committee representative described how different organisations come and provide relief after the floods, but there is little work focused on finding long-term solutions. This is why the communities themselves are trying to develop adaptation strategies.

The committee's activities are based on their understanding of the causes of flooding, which they believe are: insufficient flood protection infrastructure along Budhi Kulo, incorrect management of irrigation channel intake, and blockage of the Karnali River by a dam on Indian side. Their main activity is coordination between district stakeholders and communities in preparing flood mitigation strategies for the irrigation channel. They have also established communication with an upstream committee responsible for management of the intake and submitted a plan of action to the District Development Committee office on removal of sand from the riverbed of Budhi Kulo. They have even approached Nepal´s central government regarding its involvement on the international issues of floodwater management.

Some of the committee's activities have been successful; construction and management changes were made by the intake to decrease the amount of water that flows in the channel during the monsoon season. However, other interventions have failed; a large scale riverbed excavation that was carried out in Budhi Kulo last year increased the flow capacity of the channel, but also led to greater inundation in Shankarpur during the monsoon season.

Similarly, In Murgahawa the community has tried to reduce the impact of floods by removing sand from the Karnali River with an excavator; the measure was unsuccessful, and the community is still paying back the loan they took for renting the machine. In Murgahawa youth clubs and farmers organizations have also planted trees along the riverbanks to prevent land erosion, but the riverbanks were too weak and all the trees were swept away.

These examples show how people are trying to adapt through trial and error. They implement strategies without sufficient skills and information on how the ecosystem works which has led to

the failure of many of the experiments. There is also a concern that in implementing such initiatives, there is a reproduction of hierarchical power structures which leaves out the most marginalized segments of the community. If groups such as Dalits and Mukta-Kamaiyas are excluded from the decision making process, it is likely that they won't be the primary beneficiaries of the initiatives.

Early warning, a tool for improved preparedness

Yet another collective adaptation is the establishment of an Early Warning System (EWS), an intervention that has capacity to reduce the disaster risk. In Murgahawa, people describe how they introduced an EWS after the 2009 flood. Almost all community members take turns in monitoring the river. If the water rises above certain level, a warning is given to start packing belongings. If water continues rising, the community leader would encourage people to evacuate. The function of the system has not been tested yet during a major flood. A similar system has not been introduced in Shankarpur although floods are discussed in village meetings.

Both Shankarpur and Murgahawa are currently participating in a NGO-initiated EWS project. People hope that the project will strengthen their capacity to cope with floods. Most important for them is to know obtain information about if the flood is coming, so they get a chance to get ready and evacuate in time. Moreover, they hope to learn new skills, to receive equipment that will facilitate their safe evacuation, and to receive support for some small scale flood mitigation measures[8].

Conclusion – Emerging action build on old power relations

The main social factor that hinders adaptation through collection action is low level of networking. In this section we described how a pioneer local level institution is emerging and trying to innovate solutions for long term adaptation. The local struggle committee is strengthening the cooperation between the communities, and also bringing forward demands to district and national representatives of the state. This active approach might lead to increased support from the state. It also contributes to enabling environment for social learning and innovation. However, collective adaptation activities lack resources and knowledge, related both to local ecosystem dynamics and appropriate technology. People use method of “trial and error”

[8] The project supports people to construct culverts, bio-dykes and elevated evacuation shelters (*machans*)

and many of their initiatives indeed fail. Moreover, the current initiatives are built on prevailing power relations and there is a risk that the most vulnerable ones will be excluded from the potential benefits.

5.2 Immediate Coping

The coping chapter deals with the immediate action that people take when a flood hits. The chapter is divided into two sections where we describe how people save lives, ensure immediate needs, and protect property. Again, our focus is to analyse how access to resources and social learning steer these activities, and to identify limiting social factors. We also present linkages between coping and the adaptive actions that were described in the previous chapter.

5.2.1 Saving lives and ensuring immediate needs

When a major flood hits, people don't have much time to react. As described earlier, there is no EWS currently in place in Shankarpur, and the one that the community established in Murgahawa has not been tested yet during a big flood. In both communities people have learned what locations are usually safer even during major floods i.e. higher land.

In Murgahawa almost all Sonaha and Tharu households have boats (see Figure 8) that can be used for evacuation. Those who know how to swim can save themselves but people in both communities lack the ability to save others. However, training skills related to rescue and first aid are part of the current EWS project in the communities.

Figure 8: Sonaha man paddling a traditional wooden canoe © Kati Puhakka

Skills limited by gender roles

For Sonahas, swimming and paddling are essential livelihood skills traditionally learned by both genders, Sonaha women can thus paddle and swim. In Tharu and other groups, these skills are traditionally learned only by men. Nevertheless, this is changing in Murgahawa since it has become culturally accepted for females to learn how to swim too. Several young Tharu women have learned to swim and even older women are trying to learn, despite the challenge this represents: *"It is difficult in old age, I am scared"*, as one grey-haired Tharu woman said.

However, in Shankarpur, the traditions remain − only men can swim. The cultural practice of discouraging females to learn an important survival skill consequently makes them less capable to deal with floods. In Shankarpur, there are no Sonahas who could serve as role models and challenge the traditional thinking on what is appropriate for women and provide an example that would demonstrate that if women can swim the whole community benefits.

Social relations and evacuation

During major floods in Murgahawa people evacuate with boats or on foot while in Shankarpur people often stay in their own homes or that of their neighbours. Time for evacuation is scarce, since people don't have boats and many lack swimming skills. Also, attitudes play a role. As one Dalit woman from Shankarpur describes: "*If I will die, at least I die in my home.*" During the last major flood she stayed on an elevated level inside her house together with her young children.

Those families that have a Thati use them as shelter during the floods. A Tharu household of ten members who recently built a new house also constructed a relatively large Thati. The family provides shelter also for some neighbours but such acceptance is conditional; as the father of the Tharu family puts it: "*We welcome only those who are close to us*". In both Shankarpur and Murgahawa people tend to ask and receive help from relatives or close-by neighbours that often are of same ethnicity. Thus it becomes clear that the strength and width of social networks that a household has is one factor that determines their coping capacity.

The Mukta-kamaiya households of Shankarpur lack resources to build a Thati, therefore they need to be more inventive during the floods. They tend to lift their beds to wooden pillars or hang them from the roof while the family members stay there until the flood is over. Apparently, the

relations with better equipped households are not close enough that they could ask for help. "*We don't have another place to go to"*, a Mukta-kamaiya woman lamented.

Access to water and food

Some well-off households have their wells on an elevated level, but the majority has them on ground level. People in both communities have the habit of drinking untreated water from the wells even when they are inundated; according to them, the water does not get polluted. When other options are lacking, people drink the flood water, again without treating it.

In Shankarpur people mentioned that most households have access to a traditional medicine called *fitkiri* that can be used to purify the water. However, it is not clear how often people actually use it or how effective it is. In Murgahawa some people used water purification chemicals a couple of days after the big flood of 2009 had started. They got access to the chemicals from an organization that was involved in flood relief but normally households do not use these chemicals. There seems to be a low level of awareness of different ways to treat the water and risks related to drinking untreated water. People do know that boiling the water would make it safer to drink, but access to firewood is limited or non-existent during big floods. In situations where people have escaped to roofs or trees, they cannot do much more than drink untreated floodwater. Even in less extreme situations people prefer to use the scarce firewood for cooking whilst treating the water is not seen as priority.

As a result, people seem to consider that stomach cramps, diarrhoea and other water related diseases are an inevitable, somehow normal part of their life during the floods. One can assume that this attitude remains since people lack knowledge and resources to change the situation.

Even moderate floods limit people's mobility in both Shankarpur and Murgahawa. To ensure that there is enough food, those who don´t have a sufficient food stock from their own production buy food prior to the monsoon season. In both villages people have also developed a habit of drying vegetables during the winter season, to be consumed during the rainy season. For the resource poor households stocking up beforehand is necessary also because of lack of labour work opportunities during the rainy season. Dalits in Shankarpur need to take unfavourable loans to stock up since they don't produce enough of food nor earn enough from labour work.

The traditional diet in the area consists of cooked rice and lentils. In normal conditions people use mud-stoves that are built either on courtyard or on the floor of an indoor-kitchen. Cooking becomes difficult when houses and courtyards are inundated. During moderate floods those who own bull carts can cook on top of them. In Shankarpur, several people use tin boxes as stoves. These can be either lifted up from the ground level with wooden sticks or used in Thati. However, if a major flood strikes suddenly, there is not much people can do. With some luck they have already cooked food and have time to take it with them. They might consume raw grains that they managed to evacuate. In other cases, "*we stay hungry*", as people commented in a group interview in Shankarpur.

When a major flood hit Shankarpur in 1983, many people found themselves in desperate situations. The water level rose so rapidly that people had to save their lives by climbing onto the roofs of their or neighbours houses and staying there for days; many of them survived only on raw rice and maize and a group of Dalits had to starve.

In Murgahawa those Sonahas that have a two-storey house have fewer difficulties since they can cook in the second floor, where they also store firewood. And if necessary, all the community members that have boats can evacuate both themselves and their food stocks to a safe location.

Conclusion – Adapted ones cope better

In this section, we presented that weak social relations and cultural norms impede people´s capacity to save lives and ensure immediate needs. We perceived that in Murgahawa the traditional gender roles, which hinder women from learning to swim, are changing but in Shankarpur there is no sign of this. Help is not exchanged equally between the community members - the relations are strongest among relatives and neighbours of same ethnicity. Also, the coping capacity is to a high degree based on a previous adaption. Those who can cope best are the ones who are the most prepared, such as people who in advance constructed Thatis, two-storey houses and elevated hand pumps, or who purchased boats and learned to swim.

5.2.2 Protecting property

Besides saving their lives, protection of property is a high priority for every household. People in both villages often start packing their crops and other belongings when they suspect that a flood

might be coming. The most important property for them to evacuate is the food stock, other belongings are taken if the time permits.

Deheri and other ways for storing grains

Traditionally the grains are stored inside *Deheri*, a container made of grass, bamboo and mud (see Figure 9). A small Deheri can be up to a meter high while the most common ones are up to two meters high. People start to take grain out of Deheris when they think a big flood might be coming; often the preparation is done in vain and grain is lost in the process. When a big flood really comes, people usually don't have time to save all their grains. A Tharu woman from Murgahawa tells: "*We try until the flood gets higher and higher. There is a small type of Deheri too; we watch how they flow in the river.*"

Figure 9: *Deheris* are traditional containers for storing grains. © Kati Puhakka

Although Deheris have shortcomings, they can be built with few resources and this is probably the main reason people have not started to use alternative ways to store their grains. Thus, some households with big agricultural production have recently started to store part of their grains in households of relatives that live on higher land; this way they minimize the risk of loss. Other households that produce more grains than they consume tend to sell excess production well in time before the monsoon season.

Bull carts, boats and gender roles

Since agriculture is the main livelihood in the area, many households have a bull cart (see Figure 10), which can be used for transporting belongings to safer places in the initial phase of a flood, when the water level is still relatively low. As described before, in Murgahawa many households have boats, since they are needed for livelihood activities. Those who own boats have more time to react than others; in addition to using the boats for evacuation, they provide transportation for the belongings even when the water level is high. Since the boat has multiple purposes, Sonahas consider it "*like a leg*", as a Sonaha man stated.

Figure 10: Bull carts are used for transportation, in this case of paddy to a rice mill. © Kati Puhakka

In a discussion held in Murgahawa, women described the different roles of men and women during a flood; "*Women pack belongings and men run away*", referring to the practice of men transporting belongings to safer places with bull carts, boats or on foot, while women take care of packing. Driving a bull cart and paddling a boat is something that only males learn to do, although the rule does not apply to Sonahas, as described earlier. Even though the coping capacity of households would increase if all its members would have as wide range of skills as possible, the skills are again divided according to traditional gender roles. In a flood, the general social rule seems to apply: the household is the most appropriate place for women while public spaces are dominated by men. This tradition persists although many male household members are working in India during the monsoon season. It is usually the young men who migrate, meaning that the older ones are in charge of the evacuation activities.

The belongings that cannot be evacuated are usually placed on the Thatis, second floors, or tied with ropes close to the roof. Those who have Thatis or second floor are usually able to save most of their belongings during big floods. Those who don't tend to suffer bigger damages. Again, the linkage between ability to cope and previously carried out adaptation activities is apparent.

"Big animals are left to God"

Saving livestock during a flood is a challenge in both communities. As described earlier, there are losses of livestock during big floods; some also die afterwards due to diseases and lack of fodder. Even during normal monsoon people face challenges, they are used to take livestock for grazing close to the riverbank, but in monsoon season it's not possible. After a major flood it is even more challenging to find grazing places for cattle; in addition fodder storage is often swept away.

Those who have constructed elevated animal sheds can keep their small livestock such as goats and hens there during moderate inundation. If the water level rises small livestock can be either transported to safer locations or kept in Thatis. Large livestock such as cows and buffaloes are normally kept tied with long ropes in the courtyard. When the water level rises over the knee level, the animals are let loose so that they can try to save themselves. As a Pahari man from Shankarpur describes, "*Big animals are left to God*". Their owners collect the ones that survive after the flood. People lack ideas as to what else could be done to save the animals.

Conclusions – Paddle if you can

The strategies that people take to evacuate their property are linked to their economic status and livelihood choices; although boats are very useful during floods, people do not build or purchase them unless they have also some other use for them. During major floods people primarily focus on protecting their own property, which is why every household needs to have the capacity to cope by themselves. Again, traditional gender roles pose limitations: even though many male household members are in India during the flood season, transportation activities are not seen appropriate for women. Also, higher level of innovation and coordination would strengthen the capacity of communities to cope. People could establish safe areas for animals during flooding, enhance traditional grain storage and improve transport capacity through sharing boats and bull carts.

5.3 Recovery

In the recovery chapter we describe how people rebuild their lives and livelihoods after a flood. We analyse how they access the necessary resources for recovery and how the learning process contributes to recovery. The underlying social factors are once again under the scope.

Social relations and temporary migration

All community members in Shankarpur and Murgahawa agree that outside help from the government and organizations is scarce. After the destructive floods of 1983 and 2009 different organizations and the government provided some emergency supplies. In Murgahawa people stayed in a camp for some days in 2009 but "*there was not enough food, some people did not get anything*", as people described in a group interview. Relatives and neighbours supported each other for basic needs.

However, social relations don't benefit people much in recovery; big floods affect everyone in the community, therefore the support that the community members can give to each other is quite limited. Neighbours and relatives help each other with urgent food needs and with rebuilding the houses, but financial support is scarce. As described earlier in the coping chapter, the strength of the social support networks is determined by ethnicity and position within the community. The majority of the households don't have relatives in other areas that could help them through difficult times.

People in both villages avoid selling their productive assets such as big livestock but do so with small livestock such as goats and pigs. However, after a major flood there is little to be sold since the floods flush away livestock, food stocks, and other belongings. Since the income opportunities in the area are scarce, many households send young men to India to earn money. Temporary migration is a regular livelihood strategy for many households but it intensifies after a destructive flood. However, the migration does not bring an immediate relief; the family members that go to India return with their earnings after several months.

Learning from the past – creation of local financial institutions

Since people need instant cash to cover their most urgent needs, such as buying food stocks and reconstructing their homes, it is a widespread practice to take loans. In Shankarpur, however, people are very hesitant to take big loans because of bad experiences in the past. Several

households were forced to sell parts of their land after having difficulties to pay back the loans they took after the flood of 1983. One Pahari man tells how his family took a loan of 10 000 NRS and ended up paying back 70 000 NRS. "*It took us many years and caused lots of problems.*" The family had to sell parts of their food production and some members went to India to earn money. Some families are still paying back loans to the Agriculture Development Bank, the main loan provider at the time. In Murgahawa too, people have struggled to pay back loans. After the big flood of 2009, many took loans from a NGO. The loans were meant for starting up a micro-enterprise and people needed to lie in order to get them. Some have managed to pay back their loan while others are struggling to do so.

In addition to having to pay high interest rates, households have rather limited access to loans from financial institutions; only those who own land or have other significant property, can access the loans. For these reasons, households both in Murgahawa and Shankarpur have founded different Community Based Organisations (CBOs) that offer loans in times of need. Almost all households are members in at least one local saving groups or other organization, such as community forest user group, which also provides loans for their members. The members can receive small loans with reasonable interest rates and payment periods. However, not all households are equally accepted as members.

In Shankarpur a group of Dalits has very recently started their own saving group, because they were not granted a membership to the other saving groups. In the absence of other options they have been dependent on lending money from local landlords. They repay the loans from their scarce food production, from wage labour earnings, and by collecting and selling firewood. But, as soon as they manage to pay back one loan, they need to take another one. "*We are always in debt. We don't have much to eat ourselves because we give so much to the moneylender*", as they reflected in a group interview.

Dalits also described that during flood relief activities, they receive less support than other households although they are severely affected by the floods. According to them workers or volunteers from different organizations come to visit the village but "*they just collect data and go*

away. The support goes to influential and less affected people". Dalits summarized their experience of discrimination with reflecting: "*we are not powerful members in our community"*.

Another group in Shankarpur that struggles with recovery is the group of Mukta-Kamaiyas; "*Nobody gives us a loan because we don't have property,"* one said, referring to the fact that they own only few kattha of land. They didn't mention why they are not members in saving groups; if they are excluded or simply cannot afford to join. As a recovery strategy the men migrate and the women of the families walk to the Indian forest where they get to collect firewood in exchange for labour intense work. Later on, they sell the wood in the Rajapur market.

Conclusions – Mutual support, migration and loans for recovery

In this chapter we presented that due to lack or complete absence of relief and recovery interventions, people are to a high degree dependent on their social relations. However, after a big flood resources of the majority are exhausted. Since people need financial capital in order to bounce back, they migrate temporarily and take loans. People have learned from the past that access to commercial loans is difficult and that the terms are unfavourable. Local saving groups and other CBOs have emerged as a result. Although this improves the capacity of communities to recover, the marginalized groups still face difficulties in joining the groups.

6 Discussion

In the findings chapter we described what kind of strategies people employ during adaptation, coping and recovery. We analysed adaptive capacity from the perspectives of access to resources and social learning, and further identified limiting social factors. We perceive that our findings are suitable for *moderatum* generalizations; they can be generalized to a theory level rather than to populations. In this chapter we reflect upon the main findings and discuss them with relevant academic literature.

As we reasoned in our theoretical framework and showed in our findings, adaptive capacity requires access to different kinds of capital. We found the access to land to be a central factor. Except for Sonahas, those who have only few kattha of land face difficulties in making a living, while the most marginalized groups are dependent on wage labour with unfavourable terms. Wisner et al (2004) also highlight that access to land is crucial in flood response capacity - from

the possibility to build a house in safe place, to the ability to receive flood relief for destroyed property. In addition to unequal access to land, it seems that structural discrimination towards Dalits hinders them in accessing financial and natural capital that are necessary for adaptation, coping and recovery.

In our research area, the main livelihood alternative to agriculture and local wage labour is temporary migration. People rely on it both as a regular livelihood strategy and as a strategy to bounce back after a destructive flood. Barnett and Webber (2009: 26) suggest that temporary migration benefits adaptive capacity by providing access to remittances and information that is otherwise unavailable. However, others (e.g. Thieme et al 2005: 110) argue that migration poses many risks for the unskilled and uneducated Nepali people. Such is also the case in the Rajapur area: migrants face unsafe working conditions and expose themselves and their families to communicable diseases. Temporary migration is therefore an alternative which places the poor between a rock and a hard place.

Although our study is not a comparative one, having two units of analysis revealed some interesting aspects. The residents of Murgahawa seem to possess better adaptive capacity than those in Shankarpur. We believe one reason is that half of the population, Sonahas, have traditionally lived along the rivers, while many in Shankarpur emigrated from the hills and lacked knowledge about floods. People have learned to deal with floods little by little, drawing from their own experiences and learning from others. In Murgahawa, the indigenous knowledge of Sonahas has benefited the whole community. As a young Sonaha woman notes: *"Other groups did not think about flood preparedness so much before. Recently they have started to replicate some practices from the Sonaha people".*

Likewise, Kelman et al (2012: 12) argue that indigenous knowledge has a strong potential to contribute to disaster risk reduction. However, it is often not recognized and utilized (ibid.). In our analysis we presented that Sonahas are well adapted to floods, thanks to their indigenous knowledge. We also demonstrated that others have been slow to adopt their traditions. Maheu (2012: 202) suggests that in order to distribute indigenous knowledge, focus should be put on strengthening horizontal communication between the community members. Increased networking

and equity between ethnic and social groups would strengthen social learning and enrich the adaptive capacity of all community members. Similarly, Dulal (2010: 629) proposes that exchange of past and present flood response strategies between different flood prone communities would lead to higher adaptive capacity.

We believe that the hierarchical power relations and weak social relations between different ethnic and social groups are the main limitations of social learning in our research communities. Thus, these structures are not set in stone. As seen in Murgahawa, the position of Sonahas has recently improved and the interaction between different groups has increased. This has also contributed to the changing gender roles. More women across ethnic groups are learning to swim, following the Sonaha tradition, while in Shankarpur women are still discouraged from learning this essential skill.

However, indigenous knowledge cannot provide all the answers. When talking about possible improvements people seemed to lack alternative response strategies. *"We don't have ideas what else could be done"*, as a Tharu man from Murgahawa commented. Lack of scientific knowledge about appropriate mitigation and adaptation strategies has resulted in wasting scarce resources on unsuccessful experiments. People would undoubtedly benefit from better access to knowledge about flood resistant crops, soil and water conservation, flood resilient building technology (Dulal et al 2010: 631), and Early Warning Systems. That said, those who would most desperately need to change their adaptation and coping strategies lack the necessary knowledge and other resources to do so. The recurrent floods, in turn, keep them in the vicious cycle of poverty.

The hindering social factors that we identified are part of a wider social environment which limits the choice and the effects of adaptation options individuals employ (Cutter et al 2012: 308). Jones and Boyd (2011: 1271) confirm in a similar study carried out in Western Nepal that the restrictive social environment especially affects the adaptive capacity of the marginalized and socially excluded. Their voices are less likely to be heard in the decision making process which, in turn, could strengthen their capacity (ibid.). We also found in our study that the experience of being

powerless seems to be so deeply rooted in the minds of Dalits and Mukta-Kamaiyas that instead of confronting the persisting power relations, they reinforce them by conforming to them.

7 Conclusion

Our research aim was to analyse social factors that hinder the adaptive capacity to recurrent floods in the chosen communities. With help of the cycle of response strategies we described in detail adaptation, coping and recovery strategies, and focused on access to resources and social learning. Finally, we identified a set of social factors that set limitations to adaptive capacity: hierarchical social relations hamper Dalits to access necessary capitals, cultural norms prevent women from learning important skills, and weak social relations and low level of networking between different social and ethnic groups hinder the process of social learning.

Although it is hard to predict the future course that the individuals and communities as a whole will take, these limiting social factors will continue to constrain adaptive capacity as long as they prevail. It is important to note that social structures do not exist in a void. In fact, they are created and enforced in everyday social interaction. Therefore, they can also be re-negotiated, challenged and changed. As is seen in Murgahawa with the example of more and more women learning to swim, change can be fast when people see an alternative and are willing to change the old structures. Thus, outsiders in form of NGOs and government institutions that implement relief and development projects need to be aware of limitations related to the access to knowledge and resources in order to be able to empower the most vulnerable ones and to gain sustainable results.

While some changes can be made locally, one needs to be aware of the large-scale structures that enable or limit adaptive capacity. Even though the focus of our study was on local level, it is clear that factors such as slow economic growth and political instability of the country pose challenges. Since there are very few off-farm employment opportunities in the Rajapur area, people continue to be dependent on agriculture. Large-scale landowners are able to make a profit from this risk-prone activity, while households that depend on wage labour have difficulties in bouncing back after destructive floods. The relation between land holdings and adaptive capacity in this rural context could be investigated more in-depth in future research.

Further studies about adaptive capacity in different social environmental contexts will undoubtedly cast more light on the various limiting factors. We see the identification and understanding of these factors as the first step; the next one will be to find ways how to bring about change. Inspiring stories from all over the world are needed to help communities to steer towards a more resilient future.

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9 Enclosures

Enclosure 1: List of interviewees

Interview type and description of interviewees	Reference code	Date and place
Focus group interview, CDMC members	FGI S1	Shankarpur, 04.12.2011
Focus group interview, Dalits	FGI S2	Shankarpur, 18.12.2011
Household interview, Mukta-kamaiyas	HHI S1	Shankarpur, 09.12.2011
Household interview, Pahari	HHI S2	Shankarpur, 18.12.2011
Household interview, Tharu	HHI S3	Shankarpur, 19.12.2011
Household interview, Pahari	HHI S4	Shankarpur, 19.12.2011
Key Informant Interview, Social Mobilizer	KII S1	Shankarpur, 09.12.2011
Key Informant Interview, President of CDMC and Community leader	KII S2	Shankarpur, 09.12.2011

Focus group interview, CDMC + women forest group	FGI M1	Murgahawa, 08.12.2011
Focus group interview, Women group	FGI M2	Murgahawa, 20.12.2011
Household interview, Sohana	HHI M1	Murgahawa, 05.09.2011
Household interview, Sonaha	HHI M2	Murgahawa, 20.12.2011
Household interview, village elder - Pahari	HHI M3	Murgahawa, 20.12.2011
Household interview, Tharu	HHI M4	Murgahawa, 08.12.2011
Key Informant Interview, Social Mobilizer	KII M1	Murgahawa, 05.12.2011
Key Informant Interview, CDMC president	KII M2	Murgahawa, 08.12.2011

Key Informant Interview, NGO representative	KII A1	Rajapur, 08.12.2011 + additional online interview, 03.05.2012
Key Informant Interview, NGO representative	KII A2	Rajapur, 08.12.2011
Key Informant Interview, NGO representative	KII A3	Rajapur, 07.12.2011
Key Informant Interview, Struggle committee representative	KII A6	Rajapur, 10.12.2011
Key Informant Interview, WFP representative	KII A4	Nepalgunj, 30.11.2011
Key Informant Interview, WFP representative	KII A5	Nepalgunj, 28.11.2011
Key Informant Interview, WIDP representative	KII A7	Nepalgunj, 30.11.2011
Key Informant Interview, UNOHCHR representative	KII A8	Nepalgunj, 29.11.2011
Key Informant Interview: Water users committee representative	KII A9	Nepalgunj, 25.11.2012
Key Informant Interview, Bardiya National Park Buffer zone representative	KII A10	Thakurdwara, 21.11.2012

Enclosure 2: Interview guides

We used different interview guides for focus group interviews, household interviews and key informant interviews; therefore we attach all three guides in the enclosure. The guides served as a check list for our semi-structured interviews and were used in a flexible way. We asked follow-up questions while questions that had been already answered were modified or left out. We had several, slightly different key informant guides for community leaders and representatives from different organisations. In the key informant interview guide that is attached below they are combined.

Interview guide 1: Focus groups

- Introduction of who we are and what our research is about. Short presentation of terms: erosive and non-erosive coping and adaptive strategies.
- Description on how the information will be used, no names will be mentioned, interview is recorded if ok. Ask for consent.
- Introduction of participants (name and main livelihoods of the household).

Livelihoods and immediate response

1. Could you please briefly describe the history and the composition of the village? Who lives in the village? When did the different groups settle in to the village?
2. We are going to discuss about floods, could you please tell us how often you get floods, on what magnitude and what is overall impact on the village?
3. Which livelihoods are the most important ones in the community?
4. When do these livelihoods take place?
5. What is an impact of the floods on the different livelihoods?
6. How the floods impact different social / ethnic groups? Which groups in community are the most affected?
7. What are the most important needs during floods and directly after?
8. Could you please describe what is usually your situation in the village during and directly after floods concerning (please reflect on practices you consider both successful and unsuccessful): food (obtaining, storing, cooking), drinking water (obtaining, protecting drinking water sources), shelter (where do people stay, where to evacuate), livestock (what do they eat, where do you keep them), household items, mobility (what can you access), financial capital (possibility to earn money, access to credit), access to health care and situation of health (diseases, use of traditional herbs)?
9. Do you think that some of the practices discussed above might have a negative impact on your health, livelihoods or economy in long-term?

10. Do you think that there are different coping or adaptive strategies according to: gender, caste/ethnicity, geographical location, socio-economic situation, amount of land owned, other factors?

Capitals and strategies

Let's talk about the impact of floods and your coping strategies from a bit different perspectives, in relation to different capitals.

Human capital (e.g. practical skills, knowledge about flood prevention, labor force, human health):

11. Are there people in your village who have and skills and knowledge useful for coping with floods? What are those?
12. Do you have enough of labour force in the village to carry our work related with flood prevention, response and recovery?
13. How many people in the village can swim, who are they?
14. Did anyone left the village because of flooding?
15. What kinds of (new) disease are coming because of floods? Epidemics? Did some people die in floods?

Natural capital (e.g. forest, plants and fire wood, timber, sand, stones, land, standing crops):

16. What kinds of impact do the floods have to access to natural capital, both immediately and in long term?
17. Do you think some practices of using natural capital might increases impact of floods in long term?
18. Are there any strategies in place to protect the natural capital against the floods?
19. How is natural capital used to respond to floods? (e.g. planting of trees around the river, making embankments?)
20. Are those strategies successful? Why, why not?

Physical capital: (e.g. housing, irrigation channels, wells, sanitation, roads, grain storages)

21. What kind of impact do floods have on your physical capital (e.g. overflowing of sanitation, damage of roads, and damage of irrigation channel)?
22. How does the reduced access to infrastructure during flood impact on people´s livelihoods options?
23. Do you use any strategies or techniques (traditional or modern) when constructing houses, roads etc. to be more resistant against floods?
24. Are those techniques successful? Why, why not?

Financial capital: (e.g. access to formal/informal credit, savings, insurance schemes)

25. What kind of financial capital you have access to?
26. Do you need to access your savings or take loans after a flood?
27. How would use of savings and taking loans affect household in future?

28. Is the financial capital used to decrease the impact of floods in long term (e.g. saving money or taking loan to diversifying livelihoods, building safer housing etc, starting DRR activities)?

Social capital: (Networks, family, community groups, institutions, neighbours)

29. During and directly after flooding, what are the sources of support and institutions that households have access to? What kind of support would these groups, organization and institutions provide?
30. What kind of groups and institutions can support you with long-term coping (e.g. planning disaster risk reduction strategies and early warning systems)?
31. How does the government, UN and NGOs respond to floods? What kind of support has this community received?
32. Are there any social aspects in your village that make coping with floods more difficult?

Future:

33. Have you considered leaving this place for good?
34. What do you think should be done to reduce vulnerability of your village in the future? What can you do?
35. Do you think that you can continue with your current livelihoods in the future, or you think you will have to change? How?

Interview guide 2: Affected households

- Introduction of who we are and what our research is about. Short presentation of terms: erosive and non-erosive coping and adaptive strategies.
- Description on how the information will be used, no names will be mentioned, interview is recorded if ok. Ask for consent.

Background data

1. Name of interviewee/interviews:
2. Location:
3. Number of people in the household:
4. Ethnicity/caste:
5. Education level of household members:
6. Resident in the area since? (Reason for migration?):
7. Main livelihoods of household, size of land owned:

Impact

8. Could you describe how your household/livelihoods are usually affected by a normal monsoon season? Are there any damages/losses?
9. How is your household affected during a major flood? What are the major losses caused by the floods?

Immediate response

10. When a flood comes, what do you do as an immediate response to protect your life and belongings?
11. How do you fulfil your daily needs during and directly after flooding?
12. What kind of problems and needs do you have after the floods (in recovery)? How do you deal with them?
13. Are the strategies that we discussed so far usually successful, if not do you see any other options?
14. Reflecting on strategies that you have mentioned, do you think some of them might have a negative impact on your livelihoods?

Long term

15. Does the flooding have some long-term effects on your life and livelihoods? What are those?
16. How are you dealing with those long-term impacts? How could those impacts be decreased?
17. What strategies are necessary to live here with floods in long term? What are you practicing?
18. Reflecting on long term strategies that you have mentioned, do you think some of them might have a negative impact on your life/livelihoods?

Improvements necessary and future

19. What do you think is needed to improve your households coping strategies with floods?
20. What do you think is needed to improve the coping strategies of the whole community?
21. How do you see your future? Are you going to continue with your livelihoods or are you going to change? What are the obstacles for change?

Interview guide 3: Key informants

- Introduction of who we are and what our research is about. Short presentation of terms: erosive and non-erosive coping and adaptive strategies.
- Description on how the information will be used, no names will be mentioned, interview is recorded if ok. Ask for consent.

Introduction

1. Can you tell us about your background, your position in your organisation/community?
2. What does your organisation do in relation to floods in Rajapur area? (question only for organisations)
3. What other organization and institutions are active in flood prevention and relief in the area? How would you describe their work and effectiveness? (questions only for organisations)
4. Could you please shortly describe your community and the community members/our research communities (ethnicity, occupation etc.).

Impact of floods

5. How would you describe the impact of floods on your community/communities in Rajapur area?
6. Which groups or location are the most vulnerable to floods? Why?
7. Can you describe the households that have suffered most because of the floods? What kind of losses have they had?
8. Do you have any documents that would show location and magnitude of flood impact in the area? (question only for organisations)

Response strategies

9. Specific question related to clarification of PVCA: CDMC composition, Historical Timeline, Pair-wise ranking, Livelihood annual cycle, Problem tree, Livelihood Analysis, Venn diagram (question only for SCORE social mobilizers).
10. How would you describe capacity of local people to cope with floods?
11. What do people do as immediate response to floods? What kind of strategies they have to protect lives and livelihoods and secure living essentials. Do you think that they are sustainable?
12. Do they use any strategies that might have a negative impact on people themselves (or their livelihoods) in the long term?
13. What are the needs of your community/communities after flooding, and can they meet them without external help?
14. What are people doing in long term to adapt living in your community/flood prone area such as Rajapur?
    a. Do people have access to information and knowledge on how to protect/diversify their capitals and livelihoods against floods?
    b. What skills and technologies exist in the community that could support innovation and adaption of livelihoods to floods?
    c. Do you think that the adaptive strategies people use are sustainable? Erosive, non-erosive?
15. Do you think that there are different coping/adaptive strategies according to: gender, caste/ethnicity, occupation, geographical location, socio-economic situation, amount of land owned, other factors?
16. How do you think the negative impact of the floods could be reduced? What kind of action the community members themselves could take? What kind of external support would be necessary?
17. What do you think are the needs of communities for long-term adaptation, especially those they cannot meet themselves?
18. Who do you think could tell us more about those issues?