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Labour Migration as a Response Strategy to Water Hazards in the Hindu Kush-Himalayas

Sida

Executive Summary

Environmental migration is not a new phenomenon. Since time immemorial, environmental stressors have induced people to migrate. What is new is the growing understanding of the wider linkages between climate change and the environment and migration, and the implications of this for migration. A growing consensus suggests that migration is an important strategy in reducing vulnerability to environmental and non-environmental stressors through livelihood diversification (Levina and Tirpak 2006; Laczko and Aghazarm 2009; Tacoli 2009; Barnett and Webber 2009). Bringing together the climate change, development, and migration perspectives has thus become a priority for policy makers.

As a result of the overwhelming focus on vulnerabilities in the current discourse on environmental migration, migration is often perceived as a failure to adapt to the impacts of environmental stressors, rather than a possible strategy for enhancing adaptation to climate change. However, migration literature illustrates that all kinds of migrants consistently display initiative to resolve the challenges they are confronted with. In particular, labour migrants seek to utilise available options to improve existing livelihoods or create new ones. Migration should not be envisaged as a last resort or a universal response strategy, as migration requires certain resources such as financial means, social networks, access to information, and supporting infrastructure and institutions. Any assessment of the relationship between environmental stressors and migration is incomplete without an assessment of actual and potential capabilities.

In order to assess how climate change influences labour migration, it is necessary first to have a better understanding of the relationship between environmental stressors and migration for work, and of the impact of environmental stressors on livelihoods. The International Centre for Integrated Mountain Development (ICIMOD) conducted a regional study to understand the labour migration process in communities affected by water hazards in the Hindu Kush-Himalayan (HKH) region. The field assessments were conducted in selected mountain and hill communities in China, India, Nepal, and Pakistan. The major findings were as follows:

- Labour migration is one of the livelihood strategies adopted by households in communities affected by floods, flash floods, droughts, and water shortages.
- The affect of water hazards on household assets is one of the factors that influence a household's decision on whether to migrate or not.
- This response strategy varies according to the type and severity of the water hazard encountered by a household.
- Labour migration rates are relatively higher in communities affected by rapid onset water hazards, than in those affected by slow onset water hazards.
- Despite the relatively low volume, remittances have a significant impact on the quality of life of recipient households (i.e., households that receive financial remittances) and on the household's ability to respond to water hazards.
- There is a need to create a supportive physical and social environment that allows people to freely exercise their 'right to stay' as well as their 'right to move'.

The study recommends the following to support labour migration as a strategy to overcome the risks posed by water hazards:

- Mainstream all forms of labour migration, internal as well as international, in national policy.
- Facilitate the development of vocational skills among community members, irrespective of whether or not they remain in their origin communities. This will contribute to household-level livelihood diversification.
- Manage skilled migration to increase the chances of a successful migration and the volume of remittances.
- Create and facilitate investment opportunities for remittances in origin communities to enhance the contribution of remittances to the development of recipient households and their communities.
- Strengthen formal and informal means of social protection for migrants and the households they leave behind.
- Enhance knowledge generation and dissemination on the role of labour migration in people's livelihood strategies.

Note: This research was undertaken as a part of the project 'Too Much Too Little Water – Local Adaptation Strategies to Climate Induced Water Stress and Hazards in the Greater Himalayan Region' funded by the Swedish International Development Authority (Sida). The primary objective of the project was to assess the local responses to too much and too little water in selected mountain and hill communities in China, India, Nepal, and Pakistan, with a focus on local water governance, flood mitigation infrastructure (embankments), agrodiversity, and livelihood alternatives (migration) as adaptation strategies to water stress condition.

Labour Migration as a Response Strategy to Water Hazards in the Hindu Kush-Himalayas

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Introduction

Environmental migration is not a new phenomenon. Environmental stressors have induced people to migrate to new places since time immemorial. What is new is the growing understanding of the wider linkages between climate change and the environment and migration, and the implications of this for migration. Reports and media articles over the last few years have increasingly highlighted the potential challenges that the displacement of people exposed to environmental stressors intensified by climate change pose across the world, especially in the global south. Many of these reports have failed to recognise migration as a significant livelihood strategy in response to environmental and economic change. There is, however, growing recognition among researchers and policy makers at various levels of the potential benefits of labour migration and remittances for recipient households and origin communities, which has been manifested in the United Nations High-Level Dialogue on Migration and Development in 2006 and the National Adaptation Programmes of Action (NAPAs). This indicates an inconsistency between the dramatic reports on migration induced by climate change and the evidence on environmental change, migration, and development (Barnett and Webber 2009; Laczko and Aghazarm 2009; Tacoli 2009; Martin 2010; Warner 2010).

The present discourse on climate change and migration has its origins in the decades-old environmental refugee debate. The issue has been examined as a part of the discourse on the relationship between environmental stressors and migration (Kniveton et al. 2008; Perch-Nielsen et al. 2008). As early as 1990, the First Assessment Report of the Intergovernmental Panel on Climate Change (IPCC) recognised that climate change could have significant impacts on human migration (IPCC 1990). More recently, Working Group II of the Fourth Assessment Report of the IPCC identified areas affected by heavy precipitation, droughts, tropical cyclones, and sea level rise as potential sites of human outmigration (IPCC 2007). Recent research (McLeman and Smit 2006; Brown 2007; Kniveton et al. 2008; Perch-Nielsen et al. 2008; Jäger et al. 2009; Barnett and Webber 2009) indicates that migration will be one of the outcomes of the intensification of environmental stressors by climate change.

Environment stressors, namely 'rapid onset hazards' (such as floods and flash floods), 'slow onset hazards' (such as droughts), or a combination of both, are contextual influences on migration behaviour. Climate change is expected to accentuate these environmental stressors. Any resultant migration could be over short or long distances, and for short or long periods (Locke et al. 2000; Barnett and Webber 2009). Environmental migration can take several forms, notably displacement – uprooting people, temporarily or permanently, from their origin communities; labour migration – people moving to other places for work; household migration – entire households moving to another location; and community resettlement – entire communities being resettled in another place. Alternately, environmental stressors may even act to restrict migration by reducing the ability of households or household members to undertake migration. Based on a study of the drought in Mali between 1983 and 1985, Findley (1994) reported that long-distance male migration from rural Mali to France decreased during drought periods. The probable explanation is that price rises due to food scarcity forced people to spend more money on meeting their basic needs than on long-distance migration. During the same period, short-distance migration to urban centres increased as women and children left in search of work to supplement household income. Therefore, assessing the influence of climate change on migration requires a better understanding of the relationship between environmental stressors and migration; the perceived impact of environmental stressors on livelihoods; the rationale for choosing particular response strategies, including migration; the choice of destination; the migrant profile; and the utilisation of remittances.

There is a knowledge gap regarding environmental migration in general, and particularly in mountain regions. There are few studies of labour migration as a response strategy to environmental stress, and even less of these have looked at the particular situation faced by communities in mountain areas, where exposure to environmental stress is the norm, and any increase in such stresses can be expected to have a marked effect. In 2010, the International Centre for Integrated Mountain Development (ICIMOD) conducted a study to understand the labour migration process in communities exposed to water hazards in the Hindu Kush-Himalayan (HKH) region. The study was part of Phase 2 of a wider project 'Too much water, too little water – Local adaptation strategies to climate induced water stress and hazards in the greater Himalayan region', funded by the Swedish International Development Cooperation Agency (Sida). The primary objective of the project was to assess the local responses to 'Too much and too little water' in selected mountain and hill communities in China, India, Nepal, and Pakistan. At present, there is little understanding of the process by which the impacts of water hazards influence the decision to migrate for work. For one, it is not easy to isolate the impacts of water hazards from the many other determinants that influence people to migrate for work, such as globalisation, demographic processes, and other components related to climate change. Equally, the benefits and challenges of labour migration are also not fully understood. The ICIMOD study focused on the influence of water hazards on the migration behaviour, and the impact of remittances on the adaptive capacity of recipient households. This report describes the study design, the findings, and the conclusions drawn, and makes a series of recommendations on actions to support labour migration as a strategy to overcome the risks posed by water hazards.

The Research Study

Between June 2008 and September 2009, ICIMOD conducted five case studies under a regional project on 'Too much water, too little water – Adaptation strategies to climate induced water stress and hazards in the greater Himalayan region' to improve understanding of the ongoing changes in the Hindu Kush-Himalayan region related to climate change. Some cross-cutting themes emerged from the key findings of these studies: small-scale water governance and the role of local institutions, agricultural diversification and intensification, governance of flood mitigation infrastructure for adaptation to floods, and migration as part of livelihood diversification (ICIMOD 2009). Adaptation strategies related to these four themes were then studied in more depth, with more emphasis on quantitative approaches, in a second phase of the project that ran from January to December 2010. The study described here is concerned with the fourth theme on migration as a means of livelihood diversification.

In assessing the relationship between water hazards and labour migration, it is important to understand how households respond to the perceived impacts of water hazards. This response is often the outcome of a household's vulnerabilities as well as its capabilities. The structure of a society determines the extent to which a household is vulnerable. Differential vulnerability within or between communities is the consequence of unequal exposure of households to water hazards which, in turn, is due to inequalities among households in terms of access to assets such as land, housing, financial resources, and social networks, and the extent of disaster preparedness. Prevailing social, economic, cultural, and institutional systems have an effect on the ability of the household to respond (Cannon 1994; IPCC 2001; Adger 2006). The impact of water hazards

on a household is mediated by the vulnerability of their livelihoods, their socioeconomic conditions, and the institutional structures that influence the household's ability to respond to an environmental stressor. Depending on their capabilities (based on natural, financial, physical, social, and human assets), intervening factors (such as transportation and communication), and institutional mechanisms, households can adopt one or more livelihood strategies from a portfolio of responses, which may include migration, to respond to stress and shocks on livelihoods due to water hazards (Curson 1989; Cannon 1994; IPCC 2001; Adger 2006; Brown 2007; McLeman and Smit 2006; Kniveton et al. 2008).

The overwhelming focus on vulnerabilities in the current discourse on environmental migration has made migration look like a failure to adapt to the impacts of environmental stressors, rather than as a possible way of enhancing adaptation. Migration is imagined to be a manifestation of the lack of adaptive capacity, or a strategy of last resort. This perception assumes that people are mainly driven by external shocks and are not autonomous entities who use available options to improve existing livelihoods or create new ones. In contrast to this view, the migration literature illustrates that all types of migrants consistently display initiative to resolve the challenges that they are confronted with. For example, labour migrants seek to diversify household income and reduce risk to household livelihoods from environmental and non-environmental stressors. The National Adaptation Plans of Action of Bangladesh, Cambodia, Eritrea, Ethiopia, Gambia, Haiti, Mali, and Uganda, recognise labour migration as a livelihood strategy adopted by households to respond to the impacts of floods and droughts. Migration should not be envisaged as a last resort because, usually, it is not the poorest who migrate because migration requires certain resources including financial means, social networks, access to information, and supporting infrastructure and institutions. Given these requirements, migration may not be an option for some households. Environmental stressors may also slow down long-distance migration by depriving a potential migrant of the necessary resources. Any assessment of the relationship between environmental stressors and migration is incomplete without an assessment of actual and potential capabilities (Stark and Lucas 1988; Stern Review 2006; Skeldon 2002; Kniveton et al. 2008; Barnett and Webber 2009; Laczko and Aghazarm 2009; Martin 2010; Schade and Faist 2010).

Objectives

The study had four main objectives:

- To understand migration behaviour in communities affected by water hazards using current climatic variability as a proxy for future climate change impacts
- To assess whether labour migration is a positive livelihood choice in communities affected by water hazards
- To assess the potential of labour migration as an adaptation strategy to water hazards
- To assess the policy implications of labour migration as a response strategy to water hazards

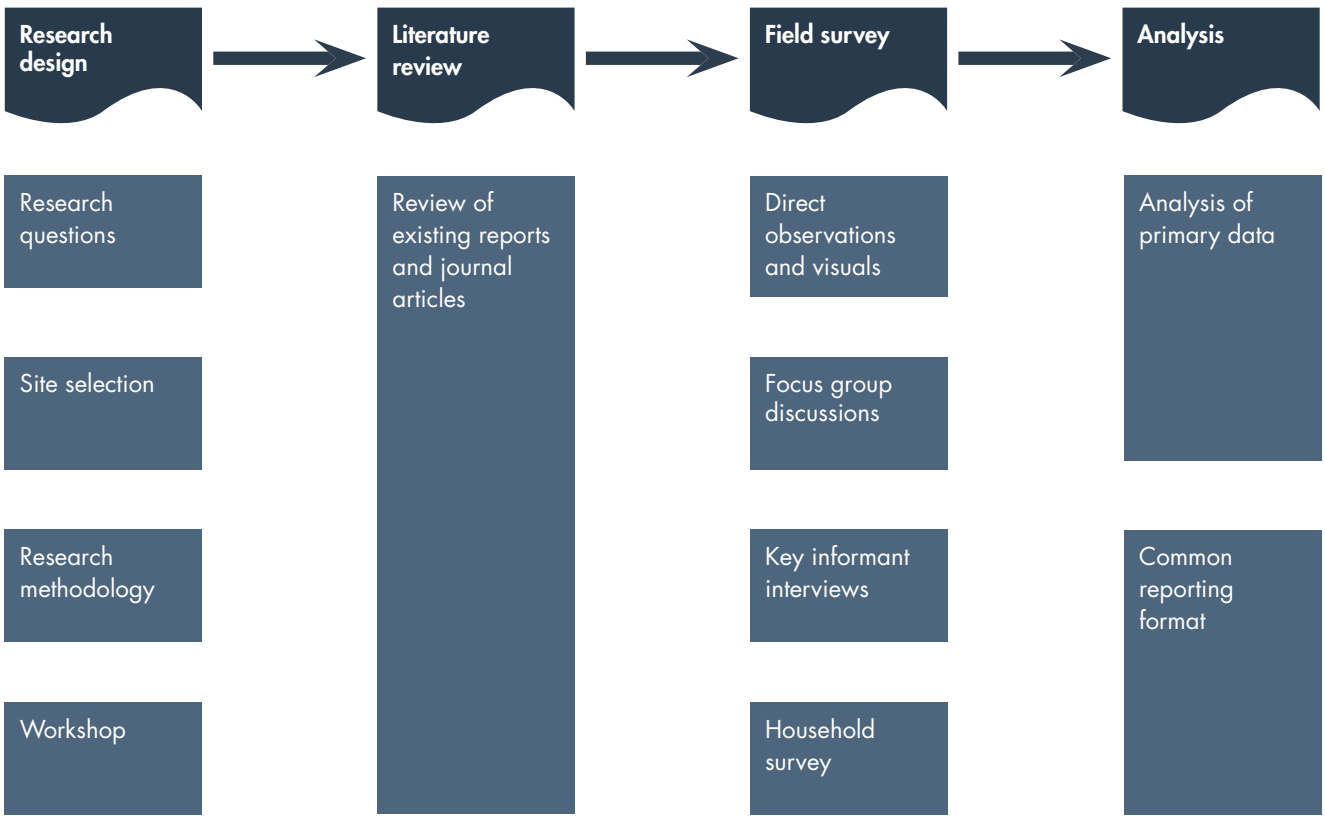
A series of research questions were formulated in line with these objectives, as summarised in Table 1.

Table 1: **Research questions**

	Research objectives			
	1	2	3	4
In water hazard affected communities, what is the relative importance of the perceived impact of water hazards on the decision to migrate for work?	X	X	X	X
In water hazard affected communities, how does the household context influence the decision to migrate for work? How does local context influence this migration decision?	X	X	X	X
Who are the labour migrants? Where do these migrants go? What occupations do labour migrants have in the destination communities?	X	X	X	X
What impacts do remittances have on household capacity to respond to water hazards?		X	X	X
What impacts does labour migration have on gender roles in migrant households?	X			

The overall framework for the research was based on that used in other studies of the labour migration (e.g., Hoermann et al. 2010). It had four components: research design, a literature review, field surveys, and analysis (Figure 1).

Figure 1: **Research framework for water hazards and labour migration study in the Hindu Kush-Himalayas**



Methodology

The research model

To assess patterns of labour migration in the context of water hazards, this study conceptualised a model based on the sustainable livelihoods approach (SLA) and the new economics of labour migration (NELM) approach. The SLA attempts to explain the causal linkages between environmental stressors and household responses in terms of the various livelihood strategies a household may adopt to respond to external vulnerabilities. A household asset base is composed of a variety of natural, physical, financial, human, and social resources. These assets are complementary to each other. No single asset is sufficient to yield all livelihood outcomes sought by a household. The loss of one asset could be compensated by other available assets. The SLA recognises the extrinsic influence of institutions and policies operating at different levels (international, national, and regional) and in different sectors (private and public) in shaping livelihoods. The SLA acknowledges the vulnerability of livelihoods to shocks and stresses, and the different strategies people use to respond to them (Carney 1998; DFID 2000; Kniveton et al. 2008). The NELM approach provides insights into the household decision-making process. The decision to migrate for work is often made at the household level, which involves the migrating and non-migrating members of the household. The household overcomes constraints in order to spread the risks posed by its limited size by broadening the relevant geographical space through the migration of one or more household members in search of work. The costs and returns of migration are shared by the migrant and the household, which expects remittances in return for the initial investment in the migration of the household member (Stark and Bloom 1985; Stark and Lucas 1988; Faist 2000). The present study envisages labour migration as a livelihood strategy that diversifies household income and reduces risk to household livelihoods from the impacts of water hazards.

The model was tested with multivariate logit and probit regressions where the migration status of the households was the dependent variable. Two indicators were included to measure the effect of water hazards. The first indicator was whether the community is affected by rapid or slow onset hazards. The assumption is that because of the immediacy and explicit nature of the impacts, rapid onset hazards have a stronger influence on the decision to migrate than slow onset hazards, the effects of which are staggered over time (Curson et al. 1989; Overseas Development Institute 2006; Warner 2010). The second indicator was whether the agricultural land of a household is affected by water hazards or not. The assumption is that households whose agricultural land is affected by water hazards will have a higher probability of sending a household member to work elsewhere (Reuveny 2007; Barnett and Webber 2009). To account for the political system, country dummies were used as proxies for intervening factors that may facilitate or prevent migration. China was taken as a reference to assess if and how the labour migration process differs among the different countries. Presumably, there will be more migrant households in countries where existing infrastructure and institutional policies facilitate migration (Ezra 2001a; Liang and Ma 2004; Adhikari et al. 2008). Information on whether or not it is difficult to find a job in the community was included to control for the economic environment. If employment opportunities in the origin community are insufficient, it is likely that more people will migrate elsewhere in search of employment (Ezra 2001a).

The effect of the socioeconomic status of the household on the migration decision was measured by three indicators. The first indicator was the highest educational attainment of the head of the household, which was included to account for cultural capital. The second was an economic index, which was constructed to account for the economic status of the household; the economic index includes household-level information on transportation and communication assets, category of the walls of the dwelling, and the number of rooms per head. Based on this, households were classified into four quartiles (economic status rising progressively from the first to the fourth quartile). The assumption is that the relationship between economic status and migration depends in part on the initial distribution of income. Increases in wealth raise the return to domestic production, which increases the opportunity cost of migrating, but also relaxes resource constraints that restrict access to costly migration. Increases in wealth also raise the maximum number of migrants a household can afford, but decrease the optimal number. Thus, migration will first increase and then decrease with wealth. In aggregate terms, this is referred as the 'migration hump' (Chan 1995; Black et al. 2006). The third indicator was the amount of agricultural land owned by a household, which was included to account for natural assets (Ezra 2001b; Gray 2009).

A social capital index was created to account for the influence of social networks of the household; the index includes household-level information on membership of social organisations, and whether or not any assistance was received from social organisations or friends during the water induced disaster. The assumption is that households with wider networks that can facilitate migration have a higher probability of migrating than households that are not so well linked (Subedi

1991; Thieme 2006). The number of male household members of working age was included in the model to control for the influence of household composition. The assumption is that the higher the number of male household members of working age, the higher the probability that one of them will migrate (Gray 2009).

An index that measures the hazard proneness of livelihoods in the past was included to account for vulnerability. Households that relied to a greater extent on agriculture, animal husbandry, and other primary sector-based livelihoods in the past, which are comparatively more natural hazard prone, are expected to show a higher likelihood of sending a member to migrate to reduce their vulnerability (Reuveny 2007; Barnett and Webber 2009).

Scope of the study

Labour migration – migration for work – is an important livelihood strategy overall in the Hindu Kush-Himalayan region; it is one way, among many, that people respond to environmental and non-environmental changes. This study focuses on the relationship between water hazards and migration for work.

The field assessments were conducted only in origin communities. In these communities, the study covered both migrant and non-migrant households. The following working definition was used to define migrant households and labour migrants: 'If during the past 20 years, any member of the household has lived anywhere other than in the origin community for more than two months at a time for work-related reasons, then the household is a migrant household and the migrant household member is a labour migrant.'

Households not conforming to the above definition were referred to as non-migrant households. Information on household assets, the determinants of migration, remittances, and conditions in the destination communities were gathered from present migrants, returned migrants, and non-migrant members of the migrant household. Non-migrant households were asked about household assets, access to remittances, and reasons for not migrating.

For the purpose of this study, water hazards were classified into: 'rapid onset hazards', such as floods and flash floods, which have short response periods, and 'slow onset hazards', such as droughts and water shortages, which could take months or even years to become a disaster (Overseas Development Institute 2006). The impacts of rapid onset hazards are comparatively more evident over a short period of time than are those of slow onset hazards. The lag period (the time between the onset of a hazard and when its impacts are realised by a household) is comparatively longer for slow onset hazards. This difference in lag period is usually reflected in the decision to migrate.

Study area

The migration field assessment in Phase 2 of the 'Too much water, too little water' project were conducted in selected mountain and foothill communities in Yunnan Province, China; the Assam, India; eastern Nepal; and Chitral District, Pakistan (Figure 2). Four of the case studies on local responses to water stress and hazards during Phase 1 of the project were also conducted in these meso-regions (ICIMOD 2009). The 43 communities studied during the migration field assessment were selected in consultation with the key informants based on two major criteria:

- The communities had a history of water hazards, namely, floods, flash floods, droughts, or water shortages.
- The communities had a history of labour migration.

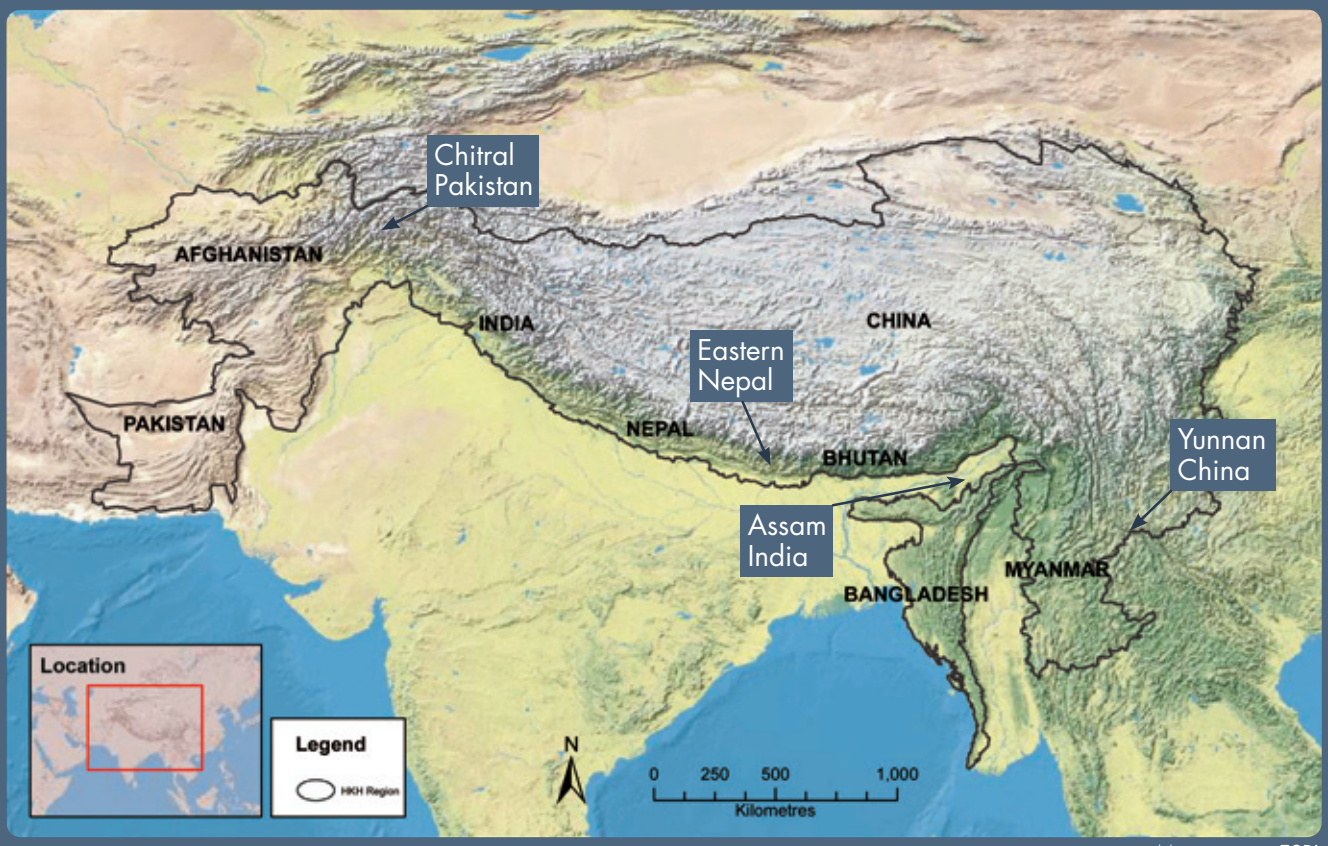
The research design incorporated both quantitative (i.e. household survey and community questionnaire) and qualitative (i.e. key informant interviews and focus group discussions) research methods. The household survey covered 1,303 households in 43 communities across the four countries studied (Table 2).

The primary objectives of the study were to understand the influence of water hazards on migration behaviour

Table 2: **Number of surveyed households at different field sites**

Country	Region	Surveyed households		
		Total	Migrant (%)	Non-migrant (%)
China	Yunnan	363	60	40
India	Assam	336	71	29
Nepal	Dhankuta, Sunsari, Saptari	365	69	31
Pakistan	Chitral	239	62	38
	Total	**1303**		

Figure 2: **The study sites within the Hindu Kush-Himalayan region**



Map source: ESRI

and to assess the impact of remittances on the adaptive capacity of a recipient household. Thus, labour migrants and migrant households were the main focus. Based on the working definition of a migrant household, and in consultation with the key informants of a community, all the houses in each of the communities studied were classified into two major groups: migrant households and non-migrant households. Households within these two groups were then selected at random for the household survey. In the analyses, the results were adjusted with weights according to the proportion of migrant and non-migrant households within the communities.

Community-level information was recorded using a community questionnaire. Key informants, such as community elders, migrants, and female members of migrant households, were also interviewed. The community perception of the relationship between water hazards and labour migration was captured through focus group discussions.

Limitations

Representative scale: The research findings represent a meso-region, not the entire area of the countries studied. Research findings from Assam, for example, are representative of areas in the eastern Brahmaputra basin, not of India in general. As the study covered a wide area within the Hindu Kush-Himalayan region, the findings are representative of all areas within this region that are affected by similar types of water hazard and have similar socioeconomic characteristics.

Current climatic variability: Current climatic variability is often used as a proxy for future climate change impacts. To a certain extent, the influence of current climatic variability on the decision to migrate is useful in understanding the future impacts of water hazards intensified by climate change. However, the future effects of environmental stressors intensified by climate change could be more complex than the impacts of current climatic variability. Not only will climate change intensify future water hazards, but the impacts of the water hazards will be complicated by changes in demographic, economic, social, and political scenarios.

Response to actual or anticipated water hazards: All of the surveyed communities had a history of water hazards. The households in these communities were generally responding to actual hazard experience. Some of the households may have been responding to anticipated future hazards, but the study did not make a distinction between responses to actual hazard experiences or anticipated hazards.

Water hazards and various types of migration: Water hazards may induce different types of migration: displacement, labour migration, household migration, and community resettlement. This study focused on an assessment of patterns of labour migration in water hazard-prone areas. All other types of migration were outside the ambit of the study.

Influence of water hazards on the decision to migrate: As this study did not have control sites, it is difficult to quantify the net importance of the influence of water hazards on migration behaviour. Instead, the study focused on the differences in migration behaviour between communities affected by rapid onset and slow onset water hazards.

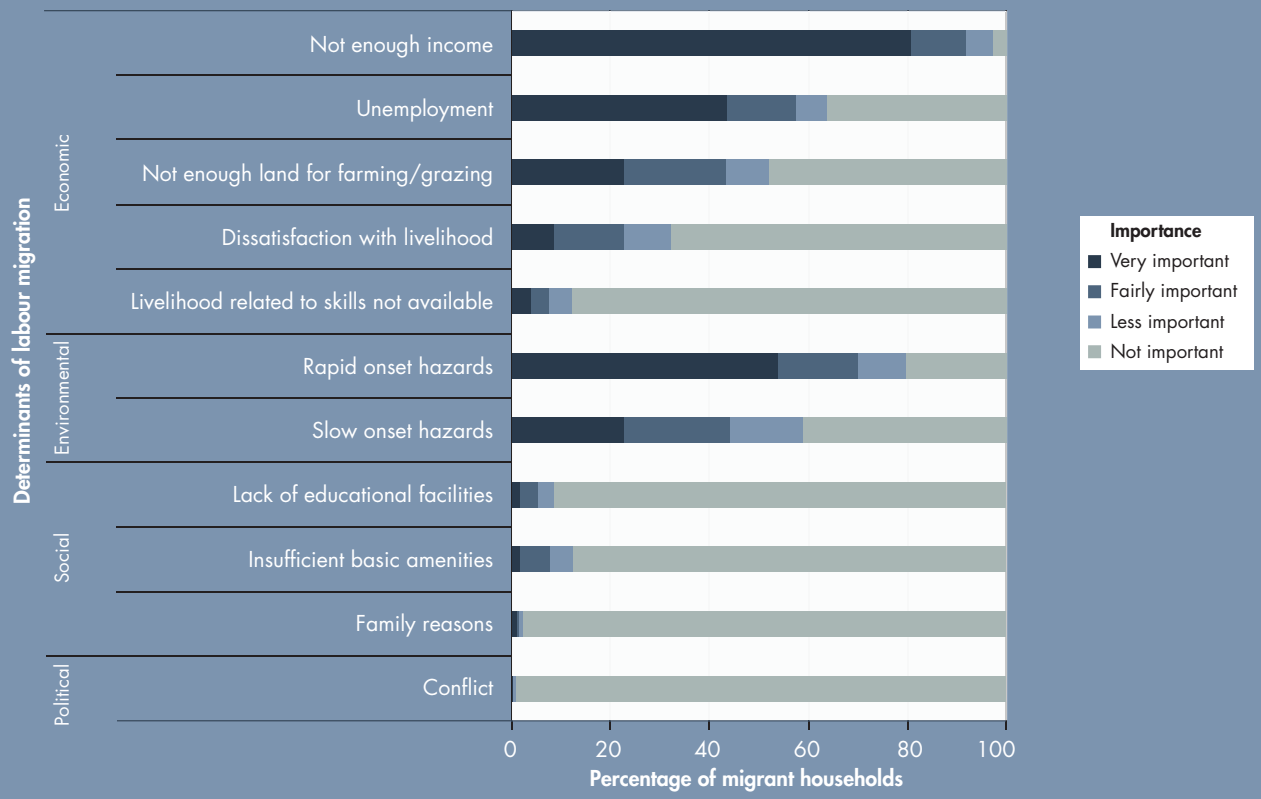
Research Findings

The findings of the study are based on descriptive statistics, probabilities calculated from robust probit regression analysis, and information gathered in key informant interviews and focus group sessions. Probabilities were calculated from regression analysis. Selected detailed calculations are shown in the Annex. The results are summarised in the following sections.

In water hazard affected communities, what is the relative importance of the perceived impact of water hazards on the decision to migrate for work?

Labour migration is a multi-causal phenomenon "that can only rarely be explained by one single reason alone" (Kniveton et al. 2008, p 30). This study identified water hazard as only one of many possible determinants of labour migration in the Hindu Kush-Himalayas. Table 3 summarises the perception of households of different factors influencing their migration behaviour. Nearly 80% of the migrant households surveyed considered water hazards as an important influence on the decision to migrate for work. But even in these households, non-environmental reasons such as not enough income, unemployment, dissatisfaction with livelihood, and lack of livelihood opportunities related to skills in the origin community were significant determinants of labour migration (Figure 3). In fact, the majority of migrant households perceived economic reasons to be comparatively more significant than other reasons for migration, including the influence of water hazards.

Figure 3: **Determinants of labour migration and their perceived importance in the migration decision**



Equally, non-environmental determinants were also sensitive to the impacts of rapid or slow onset water hazards.

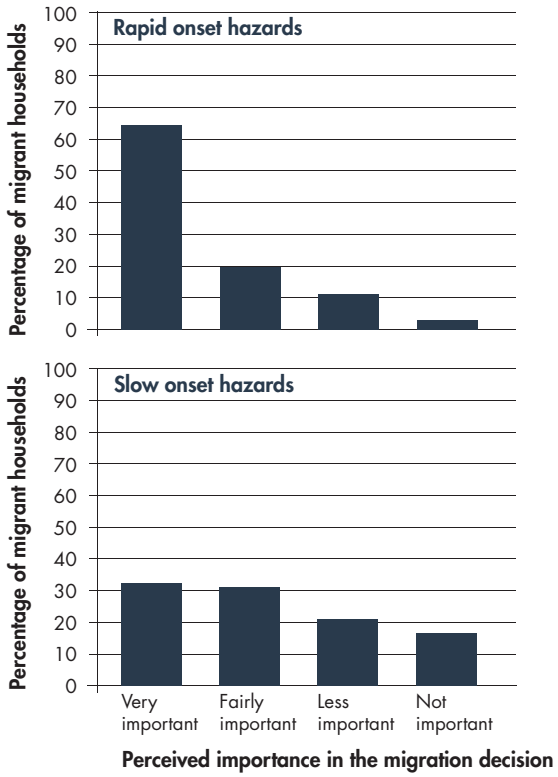
In about 20% of the migrant households surveyed, the decision to migrate for work was not influenced by the impacts of water hazards. There were several reasons: some had migrated prior to the onset of water hazards, some had migrated before the impacts of water hazards on household livelihoods could be felt, and for others the impacts of water hazards may not have been severe enough to influence the decision to migrate. Water hazards did not affect all households within a community. Labour migration has always taken place in these communities, and many migrants still leave for the reasons their predecessors did, without additional influence from water hazards.

The influence of water hazards on the decision to migrate varied depending on the type of water hazard. Rapid onset water hazards such as floods and flash floods were perceived to have a comparatively greater influence on the decision to migrate than slow onset hazards such as droughts and water shortages (Figure 4). The lag period for rapid onset water hazards is shorter than that for slow onset water hazards. The impacts of rapid onset hazards, in particular the direct impacts on household livelihoods (including loss of life and damage to dwellings and infrastructure), are more immediate and explicit and hence more easily perceived by households than the impacts of slow onset hazards, which are generally staggered over a long period of time. The study found that households in communities exposed to rapid onset water hazards had a 32% higher probability of sending a household member to work elsewhere than those in communities exposed to slow onset water hazards. Among the communities affected by slow onset water hazards, migration for work was likely to be higher in communities affected by very severe hazards than those affected by less severe ones.

Table 3: **The perception of households regarding the influence of water hazards on the decision to migrate for work**

Country	Decision influenced by water hazards (% surveyed migrant households)
China	72
India	98
Nepal	64
Pakistan	81

Figure 4: **Importance of water hazards in the migration decision**



Interestingly, in the communities exposed to floods and flash floods, members of households whose agricultural land had been damaged showed less likelihood of migrating for work than those in households whose agricultural land had not been affected. Possible reasons could be that the households are 'tied' to damaged land in times of hazard to repair or mediate flood damage, or that they receive government compensation as an alternative source of income. Further, members of households that depended on natural hazard-prone livelihoods in the past (e.g., farming or animal husbandry) showed less likelihood of migrating for work during droughts or water shortages. Possible reasons could be that household assets are tied up in natural hazard-prone livelihoods or that additional labour is needed to conduct agriculture and animal husbandry in these areas. However, more research is needed to clarify the reason for these effects.

While recognising the complexities in the influence of water hazards on migration behaviour, as well as the multi-causal nature of migration, it is clear that the impacts of water hazards do influence the decision to migrate for work in the communities studied. However, in the majority of households surveyed, the influence of water hazards was only one of the determinants of labour migration.

In water hazard affected communities, how does the household context influence the decision to migrate for work?

The relationship between water hazards and labour migration is not linear and is mediated by a host of factors including the perceived extent of the impacts of a water hazard on livelihoods, the household asset base (i.e., natural, social, physical, financial, and human assets), intervening factors (e.g., transport and communication) and institutional policies. The impacts of a water hazard can exacerbate existing household vulnerabilities. In the majority of surveyed households, the primary means of livelihood was agriculture or animal husbandry. The dependence of these activities on natural capital makes them comparatively more prone to be affected by natural hazards than secondary or tertiary sector livelihood activities. The disruption of the primary means of livelihood by water hazards reduces household income. As the level of development in the communities studied and their surrounding areas is low, there is a general lack of alternative livelihood opportunities. Households may not be able to replace the loss of their primary means of livelihood with an alternative livelihood in the local area. Difficulty in finding a job in the community increased the probability of a household becoming a migrant household by 18%.

The challenges posed by lack of alternative livelihoods in the local area are compounded for some households by a growing household size. An increase in the number of adult males in the working age group in a household increased the probability of the household sending a member to work elsewhere by 19% per additional male. Depending on the intervening factors and the household assets, one or more members of a household is likely to migrate for work under such circumstances.

The decision to migrate for work is, generally, a proactive household strategy to diversify the sources of income and reduce the risks posed by water hazards to existing livelihoods. Country dummies were used as proxies for political and administrative structures and other intervening factors that either facilitate or prevent migration. Households in the communities studied in India had a 43% lower probability of having a migrant household member than did those in China. Households in communities in Nepal had a 33% higher probability of sending a household member to work somewhere else than those in

Complexity in distinguishing between proactive and reactive migration

Water hazards can lead to the temporary or permanent displacement of some households in the communities studied. Unlike labour migration, displacement is a reactive response of households to the impacts of a water hazard. These households are mainly driven by external shocks or stresses resulting from the water hazard to seek shelter either within the community or elsewhere. In general, the entire household is displaced. Displacement due to rapid onset hazards is more apparent because the direct impacts, such as loss of life and damage to dwellings and infrastructure, are comparatively instantaneous and clearly evident.

In some cases, the distinction between proactive and reactive migration gets blurred. The displaced households in the communities studied follow one of three mobility pathways: (1) The displaced household returns to the origin community and remains there. This entire process is a reaction to the shocks or stresses on the household due to the water hazard. (2) The displaced household returns to the origin community, but as their primary means of livelihood in the origin community has been disrupted by the water hazard one or more members of the household are sent to work elsewhere. Thus temporary displacement, a reactive response to an environmental stressor, is followed by migration for work, a proactive response to diversify income and reduce the risk to household livelihoods. (3) The displaced household is unable to return to the origin community and continues to live in a neighbouring community. As their livelihood in the origin community has been completely disrupted, the household sends one or more members to work elsewhere. Thus permanent displacement, a reactive response to an environmental stressor, is followed by migration for work, a proactive strategy to diversify income and reduce the risk to household livelihoods. The last two mobility pathways illustrate the complexity involved in distinguishing between proactive and reactive mobility in the wider context.

China. This implies that differences in politico-administrative structures, market conditions, and institutional policies influence migration behaviour to a varying extent. Identification of the exact reasons for this variation was outside the scope of this study and should be pursued in future research.

Migration has a cost. The financial cost of migration includes logistical expenses, household expenses at origin, living expenses at destination, and fees charged by agents or contractors. Some migrant households may not have adequate financial resources to meet these costs, and yet migration for work may be a necessary livelihood choice for them. If the expected income in the destination community is higher than the actual income in the origin community, these migrant households take loans to finance the migration. As the outreach of formal financial services in the studied region is limited and, when present, may not provide loans to sponsor migration, some migrant households borrow from informal financial service providers, such as moneylenders, friends, or relatives. Moneylenders often charge high interest rates. Borrowers are aware of this and, where possible, take credit from within their social network (i.e., friends or relatives) as interest rates are lower and repayment instalments negotiable. As well as extending loans, social networks offset the disadvantages due to the lack of financial means by assisting in logistics, arranging jobs in the destination community, and providing emotional support to the migrant to adjust to the new environment or to the migrant household in the origin community.

The option to migrate for work may not be available as a response strategy for some households – for economic or non-economic reasons. In the surveyed communities, lack of resources prevented some households (28%) from adopting labour migration as a response to water hazards. Overall, members of households in the third economic quartile had a higher likelihood of migrating for work than those in the wealthiest quartile. In the communities exposed to slow onset water hazards, the likelihood of labour migration increased progressively from the second to the third quartile compared to households in the fourth quartile. This suggests that economic status affects migration behaviour in the communities studied. In addition, family obligations (19%), acceptance of losses due to water hazards as a cost of gaining locational benefits (8%), lack of additional household members (7%), lack of skills (3%), and health problems (3%) were other reasons cited for not migrating in search of employment.

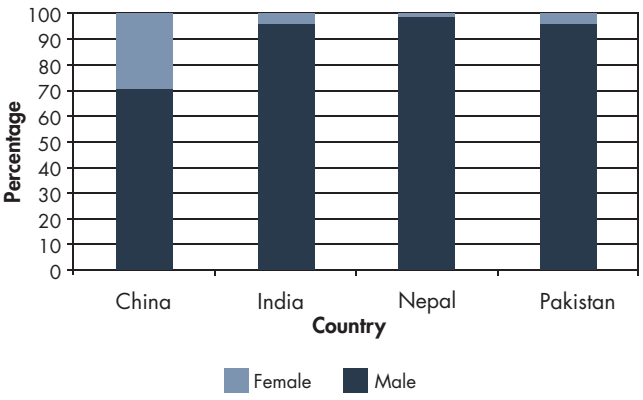
At the same time, some households responded to the impacts of water hazards without recourse to migration for other reasons, for example households whose primary means of livelihood in the origin community was secure did not migrate for work (9%); some were aware of the risk of water hazard but did not expect a disaster (8%); some did not anticipate any losses, or not serious ones (6%); and others who expected serious losses were either planning or had undertaken loss reduction measures (5%).

Who are the labour migrants?

Labour migrants across the communities surveyed in the four countries were predominantly young males of working age. Among the communities surveyed, the percentage of female labour migrants was comparatively higher in China (Figure 5). Conservative social norms, traditional division of labour between genders, and lack of education and exposure among women, especially in the mountain areas of India, Nepal, and Pakistan, explain the low percentage of female labour migrants in these communities.

The mean age of migrants at first migration was around 25 years. The majority of migrants from the surveyed communities were educated; around 90% of the surveyed migrants had some form of school education; most had completed either primary (36%) or secondary (37%) education. Most of the migrants surveyed were from lower middle or lower income classes.

Figure 5: **Distribution of labour migrants by gender**



Where do labour migrants go?

Labour migration across the communities surveyed was predominantly internal, that is, the labour migrants remained within their country of origin (Table 4), with the exception of Nepal, where a major percentage of the surveyed labour migrants moved to a regional or international destination. There could be three explanations for the situation in Nepal. First, potential migrants from Nepal are more willing to migrate to regional or international destinations because the expected income at the destination is higher than within Nepal. This expectation also makes them more willing to take loans or pool resources with their social networks to sponsor the regional or the international migration. Second, the cost of migration to neighbouring India is not substantial because of the open border, existing social networks, cultural similarities, and the short distance to urban centres in north India. In addition, migrants from China, India, and Pakistan have more livelihood opportunities in the urban centres of their own countries than do those from Nepal because of the better state of these countries' economies. Overall, the choice of destination is determined by the perception of risk and opportunity, including expected income and an understanding of the labour markets at the various destinations, which is influenced by the migrants' skills, social networks, employment agencies, and resources available to meet migration costs.

In the communities studied, the majority of migrant workers move to urban areas to seek employment. During the first migration episode, around 92% of the labour migrants surveyed had moved to a town or a city (Table 5). The same pattern was observed among migrants with second and third migration episodes. The urban orientation of labour migration reflects regional inequalities in levels of development and urban centric growth within the countries studied.

What occupations do labour migrants have in the destination communities?

An overwhelming majority of labour migrants were wage employees in the secondary or tertiary sectors in the destination communities (Figure 6). Most migrants were either unskilled or semi-skilled workers who ended up in low-paying jobs as factory or construction labourers, drivers, security guards, carpenters, tailors, chefs, waiters, cleaners, and shop assistants. Within the secondary sector, the manufacturing and construction sub-sectors employed a significant percentage of the labour migrants in all of the countries studied. Sub-sectors such as transport, storage, communications, and hotels

Table 4: **Type of destination community on first migration of the surveyed labour migrants**

Country	Distribution of the surveyed labour migrants by type of destination community*			Number of surveyed labour migrants at first migration
	Internal (%)	Regional (%)	International (%)	
China	100.0	0.0	0.0	264
India	100.0	0.0	0.0	321
Nepal	25.7	45.2	29.1	230
Pakistan	96.8	0.5	2.7	186

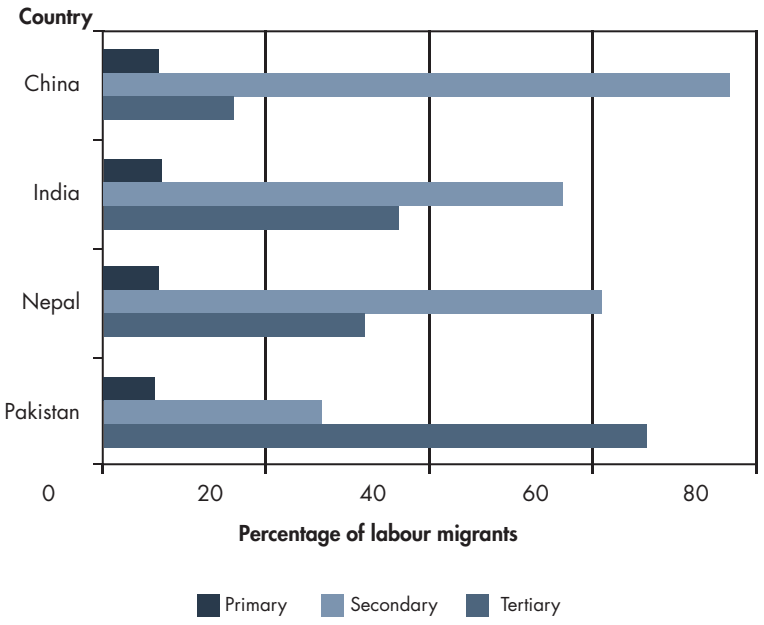
* Internal destinations are located within the country of origin, regional destinations are located in neighbouring countries, and international destinations are located in distant countries.

Table 5: **Episode-wise urban-rural difference in destination of surveyed labour migrants**

Migration episode	Urban-rural differential in the destination of surveyed labour migrants					Number of labour migrants surveyed
	Village (%)	Town (%)	City (%)	Rural total (%)	Urban total (%)	
First migration	8	37	55	**8**	**92**	994*
Second migration	11	30	59	**11**	**89**	234
Third migration	17	25	58	**17**	**83**	65

* Exact destination not known for a further seven migrants.

Figure 6: **Distribution of labour migrants in destination community by sector**



and restaurants are important employment providers in the tertiary sector. In the Chitral region of Pakistan, a considerable percentage of migrants were employed in the defence services. Migrants who were employed in the primary sector found jobs in agriculture, mines, and quarries.

Agriculture, which is the primary source of income in the rural areas of the Hindu Kush-Himalayas, is characterised by low and volatile productivity, and disguised unemployment is high. The capacity of agriculture to employ a large proportion of the increasing labour force is limited. Hence, not only income, but sectoral diversification is necessary to maximise the productivity of the labour force (Krishna 2002; Kundu et al. 2003). Labour migration provides an opportunity for both income and sectoral diversification. Most of the migrants surveyed had switched from primary sector jobs in their origin communities that are prone to affects from natural hazards, such as agricultural production and animal husbandry, to comparatively less hazard-prone secondary and tertiary sector jobs in their destination communities. Income and sectoral diversification in these migrant households reduces the risk to household livelihoods from the impacts of water hazards. However, while income or sectoral diversification may be a positive development, it is not sufficient as many of these migrants were employed in low-income activities in the destination communities.

What impacts do remittances have on household capacity to respond to water hazards?

Remittances are of two types: financial and social. Financial remittances can be monetary or non-monetary. Social remittances include the skills, ideas, practices, and knowledge that migrants bring back to their origin communities.

Volume, frequency and type of financial remittances

The volume of remittances was generally low. In the study area, the mean volume of remittance per transaction was US $178. Among the communities surveyed, the mean volume of remittances per transaction ranged from US $80 in the communities studied in the province of Assam in India, to US $286 in those studied in eastern Nepal.

Overall, half (51%) of the recipient households surveyed received remittances on an irregular basis. In India and China, 76% and 73% of households, respectively, did not receive remittances on a regular basis. Insufficient savings due to low income and high living expenses at the destination was cited as the main reason for irregular remittance transfers (Figure 7). Only around 10% of recipient households mentioned high transaction costs as a reason for the irregularity of remittance transfers.

In 76% of the recipient households surveyed, remittances were received in monetary form only; whereas around 24% of households reported receiving remittances in both monetary and non-monetary forms, including clothes, cell phones, electronic goods, footwear, accessories, toys, cosmetics, and food (Figure 8).

Figure 7: **Reasons for irregular remittance transfer**

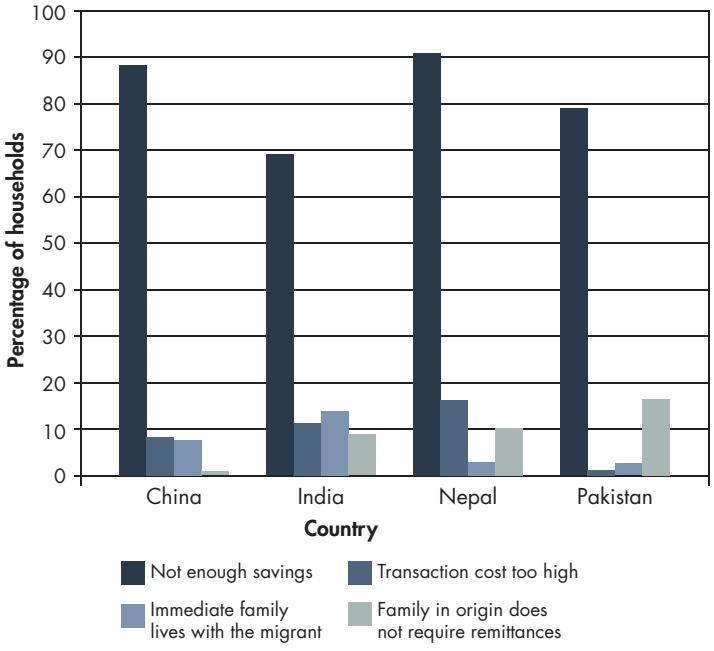
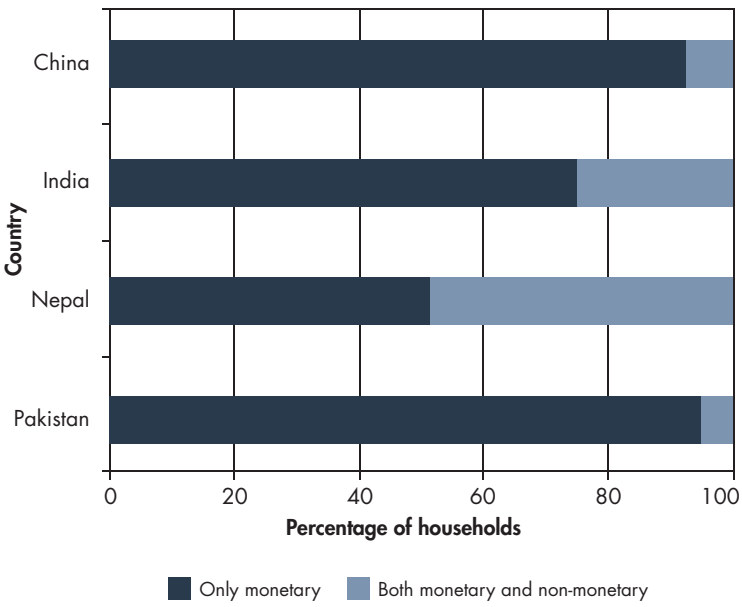


Figure 8: **Form of financial remittances**



Contribution of financial remittances to the household income

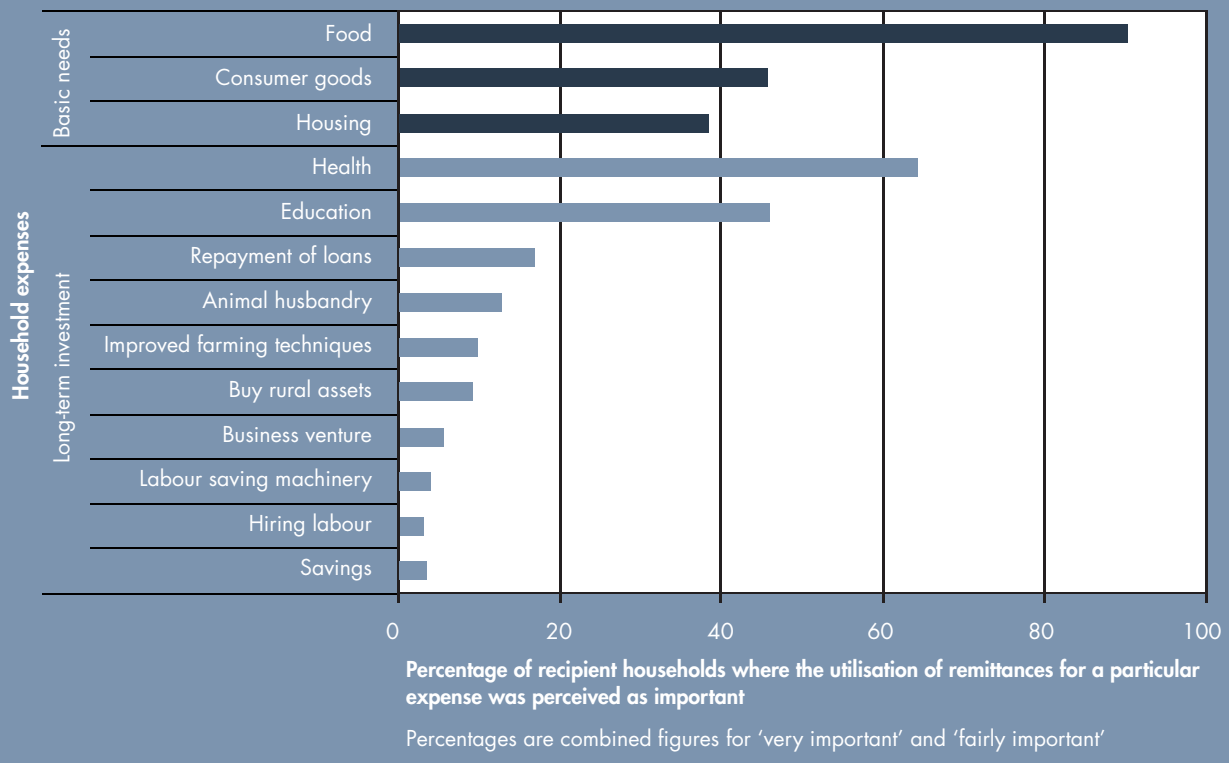
Financial remittances were significant in the recipient households, notwithstanding the low volume and irregular remittance transfers. There are three reasons. First, the overall income of recipient households was low, thus the contribution of financial remittances was significant; on average, more than half (62%) of recipient households' income was from remittances. Second, remittances provide an income stream that is not undermined by disasters. The primary means of livelihood in the origin community and the income sources at the destination are rarely disrupted by natural disasters at the same time. For example, labour migrants from 78% of the migrant households surveyed had not been affected by water hazards in their destination community. By broadening the geographical space within which the sources of household income are located, the household overcomes constraints and spreads risks associated with limited size (Stark and Lucas 1988). Third, remittances contributed to household welfare including basic needs (e.g., food, housing, and consumer goods) and long-term investments (e.g., health and education) (Figure 9). The major share of remittances was spent on basic needs, particularly food. In the recipient households, especially poor ones, such consumption could have positive effects on the health of household members because of improvements in nutrition and other basic needs.

Spending on health and education was an important utilisation of remittances in 64% and 46% of recipient households, respectively. Such utilisation of remittances makes a positive contribution to improving the quality of life and human capital in recipient households. However, only a small percentage of recipient households received enough remittances to spend on other long-term investments, such as business ventures, rural assets, and savings.

Impact of financial remittances on the community

The benefits of financial remittances are not limited to recipient households. Almost 72% of recipient households reported spending the major share of remittances within their own communities. Remittances that are spent within the origin community on basic needs contribute to the household income of some non-recipient households. Around 38% of recipient households spent remittances on building new houses or improving existing ones. Utilisation of remittances on labour intensive goods and services, such as construction, creates a demand for local services, which indirectly benefits the origin communities as a whole, including non-recipient households.

Figure 9: **Perceived importance of remittance utilisation for different household expenses**



Percentages are combined figures for 'very important' and 'fairly important'

Impact of social remittances

In the Hindu Kush-Himalayas, the returnees, as well as migrants who return home from time-to-time, bring back ideas, skills, and knowledge to their origin communities. However, the skills brought back by labour migrants are usually of little use in the origin communities and surrounding localities due to the absence of supporting infrastructure. Social remittances did not directly contribute to enhancing household adaptive capacity to the impacts of water hazard in the study area but may have had an indirect influence. There is a demand in the local study areas for certain skills brought back by the migrants like carpentry, masonry, and tailoring, which leads to income and sectoral diversification of livelihoods in the migrant households. Such diversification contributes to the enhancement of household adaptive capacity.

The knowledge brought back by the migrants also includes information on logistics, updates on market demands for quality or quantity of labour in destination communities, and their own migration experience. As social networks strongly influence the decision to migrate for work, this knowledge influences the migration decision of potential labour migrants in origin communities. The knowledge brought back by migrants could indirectly contribute to the improvement of adaptive capacity in this way.

What impact does labour migration have on gender roles in migrant households?

Labour migration in the Hindu Kush-Himalayas is a gendered phenomenon, with mostly men migrating and women staying behind, which can have both positive and negative effects on gender roles in the migrant households. The existing gender norms could be exacerbated or significantly changed due to migration (MigrationDRC 2009).

The majority of the women interviewed were happy about the migration of their household member as they perceived and accepted it as necessary for sustenance and for the future of the household. However, some women were unhappy about the long separation from migrant household members.

> "I am happy with the migration of my husband because the remittances he sends can be used for daily expenses."
>
> Wang Yan, wife of migrant, Taokong village, Yunnan, China

> "I am not happy with the migration of my husband, but it was necessary for our household."
>
> Tulika Chamua, wife of migrant, Banto village, Assam, India

Male migration, particularly that of the husband, increased the decision making power of some women in both nuclear and joint families. The decision making power of women in the remaining households did not change because of the continued presence of other male household members. In these traditional communities, household roles are predefined, and often do not change with male migration.

Predominantly male migration has increased the drudgery of women in migrant households in the areas surveyed. These women have an increased role both within and outside the house. Besides daily household tasks, they have to replace male migrants in agricultural activities, animal husbandry, forestry, and accessing markets. Male migration had had an adverse effect on the health of some women. The increased workload and separation from spouses had led to physiological stress and psychological tension. In communities surveyed in Pakistan, social norms require that a woman is accompanied by a male household member during visits to a medical centre. Sometimes women were unable to visit a medical centre due to the absence of a male household member.

Generally, women did not feel insecure because of the migration of male household members. The presence of other male members in the household, a strong social network of relatives and neighbours in the same community, or good public security were cited as reasons for this.

Discussion

A major objective of the study was to assess whether labour migration was a positive livelihood choice in the water hazard affected communities surveyed based on three criteria: decision-making processes, income at destination, and financial remittances. The assumption was that labour migration was a positive response by a migrant household if all of the following were true:

- the migrant household made a proactive decision to send one or more members of the household to work elsewhere,
- the migrant was satisfied with the decision to migrate
- the migrant earned more in the destination community than in the origin community,
- the migrant household was satisfied with the financial remittances, and
- financial remittances contributed to household welfare

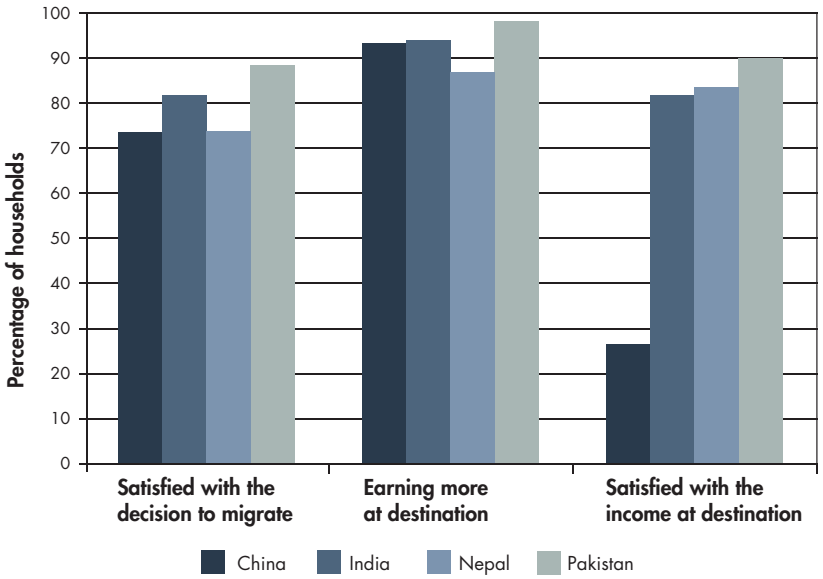
Decision making process: As the focus of this study was only on labour migration, all of the surveyed migrant households had manifested some form of proactive decision making process. These households had the prerogative to decide whether or not to send household members to work elsewhere.

The vulnerability of most households in the communities studied was exacerbated by the impacts of water hazards as a result of the lack of alternative livelihood opportunities in the local area and the absence of formal social security mechanisms. The majority of the migrant households surveyed (86%) reported that they had no livelihood options other than labour migration to respond to the impacts of water hazard. The pattern was similar in communities affected by rapid onset and slow onset hazards. Under these circumstances, migrant households were not mere passive victims of water induced disasters, but through the migration of one or more household members for work were actively attempting to resolve challenges posed by the impacts of water induced disasters. The labour migrants from a great majority of migrant households surveyed (79%) were satisfied with their decision to migrate (Figure 10).

Income earned at destination: Labour migrants from almost all surveyed migrant households (93%) were earning more at the destination than they did in the origin community (Figure 10). Labour migrants from around 71% of the migrant households were satisfied with their income at the destination (Figure 10). The majority were employed in secondary and tertiary sectors, which are comparatively less susceptible to natural hazards. Diversification into non-primary sector based sources of income in the destination communities reduced the risk to the overall livelihood basket of a migrant household, as the primary means of livelihood in the origin communities were heavily dependent on primary sector activities, which are vulnerable to the impacts of natural hazards.

Financial remittances: The literature indicates that remittances act as a safety net for recipient households in the aftermath of natural disasters (Clarke and Wallsten 2004; Suleri and Savage 2006; Yang and HwaJung 2007; Mohapatra et al. 2009). Financial remittances have an immediate and direct impact on a household's response to water hazards. The impact of remittances is fivefold. First, remittances diversify the sources of household income. They provide an income stream that is not undermined by a natural disaster. The means of livelihood in the destination and origin communities are generally not affected by water hazards at the same time. This reduces the risk to livelihoods posed by water hazards. Second, remittances contribute to household welfare by contributing to basic nutrition needs, improving living conditions, and

Figure 10: **Perception of labour migrants about the migration decision and the income at the destination**



Note: The percentages for 'satisfied with the decision to migrate' and 'satisfied with the income at destination' represent the combined figures for the categories 'very satisfied' and 'fairly satisfied'. The percentages for 'earning more at destination' represent the combined figures for the categories 'considerably more' and 'slightly more'.

Suren Lahan (aged 25) from Chokham village in Assam worked in Dibrugarh town for one and a half years. With the remittances he earned he bought a boat, which he uses during floods to shift his family and belongings to a safer location.

contributing to purchasing power for consumer goods, as well as by contributing to long-term investments in health and education. Third, remittances ensure immediate relief for the household during periods of livelihood shocks due to water hazards. For instance, they are used to buy food during lean periods. In 43% of the recipient households surveyed where the migration decision had been influenced by water induced disasters, the volume of remittances increased during or in the aftermath of a disaster. Fourth, remittances aid in recovering in the aftermath of water induced disaster. Remittances are used to rebuild livelihoods, reconstruct houses, meet health expenses, and procure household goods to replace those lost in water-induced disasters. Fifth, remittances contribute to disaster preparedness. For example, they are used to procure irrigation facilities in drought affected households, and to buy boats or improve or strengthen housing quality in households affected by floods.

In communities affected by rapid onset water hazards, spending of remittances on basic needs was considerably higher in very severely and moderately affected communities than in less severely affected communities, but there was no significant difference between those very severely and moderately affected. Spending on long-term investments was comparatively higher in less severely affected communities than in the other two categories, but the difference was not significant. There was no significant difference in spending on either basic needs or long-term investments between those severely, moderately, and less severely impacted in communities affected by slow onset water hazards. About 65% of recipient households perceived remittances to be an insurance against or security in case of future water hazards. The majority of recipient households (68%) reported being satisfied with the remittances received.

In the context of water hazards and the lack of alternative livelihood opportunities in and around the communities surveyed, the findings suggest that remittances are often a major, and sometimes the only, source of household income. A majority of labour migrants were satisfied with their decision to migrate and with their income in the destination community. Financial remittances provided immediate and direct relief to households during or in the aftermath of water induced disasters, as well as contributing to household welfare in general. The majority of recipient households were satisfied with the remittances they received and perceived them as an insurance or security against future water hazards. Thus, migration for work was a positive livelihood response to water hazards for the majority of the households in the communities studied in the Hindu Kush-Himalayas.

What are the policy implications of labour migration for water hazard affected households?

Over the last decade, the concept of adaptation has gained prominence in the climate change discourse, particularly within the United Nations Framework Convention on Climate Change (UNFCCC) agenda. The importance of adaptation strategies has been highlighted in the Copenhagen Accord. Within this discourse, there is a gradual recognition of the role of migration in adaptation (Levina and Tirpak 2006; IOM 2007, 2009, 2010; Martin 2009). The Third Assessment Report of the Intergovernmental Panel on Climate Change (IPCC) defines adaptation as follows: "Adjustments in natural or human systems in response to actual or expected climatic stimuli or their effects, which moderates harm or exploits beneficial opportunities. Various types of adaptation can be distinguished, including anticipatory and reactive adaptation, private and public adaptation, and autonomous and planned adaptation." (IPCC 2001)

"My husband is a soldier. The money sent back by him helped us to overcome the difficulties when flash floods washed away our farmlands."

Sumaira Bibi, Kashendail village, Chitral district, Pakistan

Jin Changwen, a 42 year-old male migrant from Baicai village, Yunnan, China, is employed in a stone factory in Ying Jiang County, Yunnan. His financial remittances are spent on food, clothing, consumer goods, animal husbandry, and education. They also helped to buy water pipe for irrigation.

A growing consensus suggests that migration is an important strategy in reducing vulnerability to environmental and non-environmental stressors through the possibility of income diversification. In many cases, migration not only increases resilience, it enables individuals and households to accumulate assets (Laczko and Aghazarm 2009; Tacoli 2009; Barnett and Webber 2009; Mohapatra et al. 2009). Bringing together the climate change, development, and migration perspectives has become a priority agenda among policy makers.

In this study, the focus was on patterns of labour migration, in communities exposed to rapid and slow onset water hazards. In the communities in the study, labour migration was found to be a positive response to the impacts of climatic variability, that is, to the effects of water hazards. The diversification (income, sectoral, and geographical) of livelihoods and access to remittances resulting from labour migration provided a safety net for recipient households, especially during periods of stress resulting from environmental and non-environmental stressors. Remittances supplemented household income from agriculture, animal husbandry, or daily wage labour. In some households, it was the only source of income. Remittances positively contributed to nutrition, living conditions, education, health, and the purchasing power of recipient households. In general, remittances are known to be a relatively stable source of household income during natural disasters, macroeconomic or financial crises, and armed conflicts (Mohapatra et al. 2009). Particularly during periods of water-induced disasters, remittances can be a disaster free source of income for recipient households. In this way, labour migration and remittances 'moderate the harm' caused by water hazards. In all of the migrant households surveyed in the four countries studied, labour migration was an 'autonomous' strategy pursued by households of their own accord to diversify income. It is not just an expression of existing vulnerabilities, but also of a household's capability to increase life's opportunities or create new possibilities for earning a living by actively using the assets at their disposal. Labour migration positively contributes to several determinants of adaptive capacity, notably, to financial resources, access to information, social resources, human capital, and infrastructure. Remittances have a significant potential to affect non-recipient households through multiplier effects generated by remittance expenditure. In the communities studied, recipient households were spending a large proportion of remittances to purchase goods and services from local sources. However, the investment impact of remittances was limited due to their low volume, lack of supporting infrastructure, or lack of initiative. The knowledge and skills brought back by migrants also contribute indirectly to the adaptive capacity of migrant households and, in some instances, those of potential migrant households. Thus, in the context of the IPCC definition of adaptation, labour migration seems to be a potential adaptation strategy to the impacts of water hazards for many households in the Hindu Kush-Himalayas.

The impacts of remittances are not limited to the household level and are important to national economies. At present, there are no disaggregated data on remittances available for the mountainous areas of the Hindu Kush-Himalayas. However, the national figures on international remittances for the countries studied indicate the potential of this source of capital (Table 6), even though these figures only show remittances received from international migrants. International remittances can largely offset trade deficits in middle and low income countries, contribute to sovereign creditworthiness, and provide a stable source of foreign currency earnings (Ratha et al. 2010). For example, in Nepal, remittances from international migrants are a major pillar of the national economy, contributing 22.9% of GDP in 2010. It is noteworthy that there is little information available on the patterns of remittances sent by internal migrants, either for mountainous regions in general, or for the countries of the Hindu Kush-Himalayan region, in particular. As the number of internal migrants is much higher than the number of international migrants, further studies need to focus on internal remittances as well.

Table 6: **Remittances received from international migrants in the countries studied**

Country	Remittances received in 2010 (in billion USD)	Remittances as percentage of GDP in 2009
China	51.0	1.0
India	55.0	3.9
Nepal	3.5	22.9
Pakistan	9.4	6.0

Source: World Bank 2011

United Nations agencies, national climate programmes, academics, and policymakers have used different

definitions of adaptation, which could lead to varying interpretations of this term (Levina and Tirpak 2006). Limited understanding of the relationship between labour migration and the environment increases the complexity involved in assessing the circumstances under which labour migration is an adaptation to the impacts of environmental hazards. Further understanding of the linkages between climate change and migration, and agreement on common terminologies in the climate change discourse, will further support development of migration policies to enhance households' adaptive capacities. The reasons for migration and the net effect of environmental stressors on migration behaviour will continue to form an important part of the environmental migration discourse. However, in the context of labour migration, remittances form the most tangible link between migration and the household's adaptive capacity. In the communities studied, the migrant workers, irrespective of whether their migration decision was influenced by water hazards or not, sent remittances home. Remittances play an effective role in the adaptive capacity of recipient households.

The impact of migration and remittances on social, economic, and gender inequality and on community cohesion are still rather ambiguous. The nature of such impacts depends on the selectivity of the migration process, its temporal and spatial scales, and on value judgements (de Haas 2007). The extent to which remittances could be leveraged to improve the conditions of recipient households, as well as of the origin communities, depends on the general development conditions in these communities and the surrounding areas. Moreover, the development optimism should not hide the fact that remittances are personal flows of money from migrants to their friends and families. There is a limit to which such flows can be directed to community welfare, and they should not be viewed as a substitute for official development funds. Many poor households do not have access to remittances and public funding is necessary to address the needs of such households (de Haas 2007; Ratha 2007). As migration requires resources, it may not be available to everyone; particularly the most vulnerable people are often not able to migrate. Within a socio-environmental context, migration behaviour depends on income, social networks, gender relations, and the perceived alternatives to migration (IOM 2010).

Efforts to understand the role of remittances in the adaptive capacity of recipient households and origin communities in the context of generic development, and to understand the role of the institution and equity, need to be continued.

Recommendations

Migration is not without its risks to the migrant and to the non-migrating members of a household. Yet, migration is a significant livelihood strategy for millions of people around the world. Most often, migration contributes to the improvement of the lives of the migrant, their household, and the origin community. There is a need to create a supportive physical and social environment that allows people to freely exercise their 'right to stay' as well as their 'right to move'.

This study recommends the following to support labour migration as a strategy for overcoming risks from water hazards in the Hindu Kush-Himalayan region.

Mainstream all forms of labour migration, internal as well as international, in national policy: At present, many countries in the Hindu Kush-Himalayas have different policy approaches for different streams of labour migration. National policies usually support and facilitate international labour migration. Some of these countries have specific ministries to deal with international migrants, e.g., the Ministry of Overseas Indian Affairs in India; the Ministry of Overseas Pakistanis in Pakistan; and the Department of Foreign Employment in Nepal. However, these same countries do not have exclusive ministries to deal with internal labour migrants. This is despite the fact that the number of internal labour migrants far exceeds that of international labour migrants in most of the countries in the region.

The internal migrant workers are eligible for the state's social protection policies but are inconspicuous as a separate category based on their migrant status (Sabates-Wheeler and Waite 2003; Srivastava and Sasikumar 2003). Several ministries or agencies generally deal with the concerns of internal labour migrants without treating them as 'internal' labour migrants specifically. Government agencies do not show the same enthusiasm when dealing with the concerns of internal labour migrants as with international labour migrants. In ethnically diverse countries, such as those in the Hindu Kush-Himalayan region, internal labour migrants often confront challenges that are similar to those faced by international labour migrants. To support labour migration as a livelihood strategy, there is a need to mainstream both internal and international labour migration in national policy.

Facilitate the development of vocational skills among community members, irrespective of whether or not they remain in their origin communities: The demand for specific vocational skills in local and regional markets needs to be identified. Development of these demand driven vocational skills will increase the likelihood of community members securing jobs in secondary or tertiary sectors either in the local area or elsewhere. Income and sectoral diversification are necessary to reduce the risk to household livelihoods, which are primarily dependent on natural hazard-prone primary sector occupations. Non-primary sector occupations are comparatively less prone to natural hazards and have greater potential for employment generation.

Manage skilled migration to increase the chances of successful migration: The identification of viable markets for specific skills is necessary to maximise the returns from migration. If migrants could be directed towards suitable labour markets where there is a demand for their specific skills it could increase their income, which in turn could increase the volume of financial remittances. The management of migration flows could also increase the accessibility of migration for work among the relatively poor. This will, in turn, enhance equity in the access to remittances. Management of labour migration should include the following: (i) prepare and raise awareness among the host community, particularly if migrants belong to a different ethnic group to the host population or are perceived to be competitors for employment opportunities; (ii) create mechanisms to manage inflow in the destination community as this can increase pressure on land resources and on public services (healthcare, potable water, employment opportunities); (iii) build formal and informal support systems for the family left behind by the migrant workers in the origin community; and (iv) where appropriate, include environmentally vulnerable communities (particularly at less advanced stages of environmental degradation) in labour migration schemes; and (v) the leveraging of remittances to increase the developmental benefits for recipient households and origin communities.

Create and facilitate investment opportunities for remittances in origin communities: The absence of supporting infrastructure, the low volume of financial remittances, and lack of local demand for the skills brought back limits the beneficial effect of financial and social remittances on recipient households and their origin communities. To enhance the role of remittances in the development of recipient households and their communities the following should be undertaken: (i) develop supporting infrastructure; (ii) identify local markets in origin communities or surrounding area for the human capital, new skills, and knowledge gained by the migrants at the destination; and (iii) tailor investment or savings opportunities to fit the relatively low volume of financial remittances.

Strengthen formal and informal means of social protection for migrants and the households they leave behind: Migration involves risks for both the migrant and the non-migrating members of the household. Measures must be taken to reduce these risks by strengthening formal (government legislation and programmes) and informal (non-government programmes and social networks) means of social protection. National legislation provides a framework for the protection of labour migrants, but there is no guarantee that the authorities concerned will abide by all of the provisions. Under such circumstances, the role of extended family networks, kin and clan networks, hometown associations, and other such social networks in providing social protection to labour migrants and non-migrating members of the household assumes significance (Sabates-Wheeler and Waite 2003).

Enhance knowledge generation and dissemination on the role of labour migration as a livelihood strategy: Labour migration has become a key issue in today's globalised world. For a long time, labour migration has been one of the significant livelihood strategies of the people in the Hindu Kush-Himalayan region. Migration is a crosscutting issue that influences the lives of mountain people in multi-faceted ways. Migration could be perceived as a challenge by some, but it also has many benefits for livelihood strategies, poverty alleviation, gender equity, disaster risk reduction, climate change adaptation, and natural resource management, and these need to be recognised and harnessed. This study has attempted to answer some of the questions regarding the relationship between the impacts of water hazards and labour migration in selected areas of the Hindu Kush-Himalayan region. Further research is necessary to assess the same relationship in other areas within the region to identify similarities or differences with the present findings. This will help to fill the knowledge gap in the region on the impacts of water hazards on migration behaviour, and the impact of remittances in building the adaptive capacity of recipient households.

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Annex: Detailed Calculations

Table A1: **Stepwise robust logit regression of household migrant status (non-migrant = 0, migrant = 1)**

Country	Model 1	Model 2	Model 3	Model 4	Model 5
China					
Pakistan	-.137	-.395	-.322	-.975	-.578
	(.876)	(.854)	(.837)	(.806)	(.837)
India	-1.379*	-3.784***	-3.749***	-3.690***	-3.569***
	(.663)	(.701)	(.711)	(.665)	(.664)
Nepal	1.486*	1.112	1.063	1.546**	1.659**
	(.681)	(.573)	(.561)	(.541)	(.540)
Rapid onset hazard [slow onset hazard]		1.410	1.335	1.560*	1.559*
		(.735)	(.734)	(.680)	(.680)
Difficult to find job		1.388***	1.384***	.824*	.905*
		(.368)	(.358)	(.383)	(.386)
Education level of household head [no education]					
Primary			-.026	.087	.031
			(.221)	(.276)	(.254)
Secondary			-.062	.357	.291
			(.263)	(.303)	(.290)
Higher			-.563	-.523	-.618
			(-.026)	(.087)	(.031)
Economic assets [4th quartile]					
1st quartile			.285	.644	.713
			(.328)	(.388)	(.370)
2nd quartile			-.020	.327	.349
			(.244)	(.230)	(.231)
3rd quartile			.611*	.831**	.844**
			(.306)	(.297)	(.304)
Own agricultural land (in hectares)			.002	-.036	-.030
			(.017)	(.019)	(.018)
Social capital			.131	.126	.117
			(.086)	(.097)	(.103)
Number of men >14 years in household				.843***	.859***
				(.114)	(.109)
Own agricultural land affected					-.639**
					(.208)
Hazard-prone livelihood index (past)					-.515
					(.322)
Constant	.956	.685	.560	-1.516**	-.160
	(.553)	(.574)	(.592)	(.577)	(.797)
Pseudo R^2	.11	.15	.17	.27	.29

Notes: N=1,063 households; weighted analysis; clustered according to 40 sample units; robust standard errors in parentheses; reference categories in square brackets

*** α<.001, ** α<.01, * α<.05

Table A2: **Robust probit regression on household migrant status (non-migrant = 0, migrant = 1)**

Country	Migrant status	
China		
Pakistan	-.331	(.481)
India	-1.967***	(.353)
Nepal	.899**	(.314)
Rapid onset hazard [slow onset hazard]	.846*	(.378)
Difficult to find job in community	.448	(.236)
Education level of household head [no education]		
Primary	.030	(.142)
Secondary	.182	(.167)
Higher	-.355	(.217)
Economic assets [4th quartile]		
1st quartile	.440*	(.214)
2nd quartile	.206	(.136)
3rd quartile	.477**	(.177)
Own agricultural land (in hectares)	-.019	(.010)
Social capital	.080	(.058)
Number of men >14 years in household	.493***	(.062)
Own agricultural land hazard affected	-.375**	(.119)
Hazard-prone livelihood index (past)	-.269	(.185)
Constant	-.129	(.466)
Pseudo R^2	.28	

Notes: N=1,063 households; weighted analysis; clustered according to 40 sample units; robust standard errors in parentheses; reference categories in square brackets

*** α<.001, ** α<.01, * α<.05

Table A3: **Marginal changes in probability of becoming a migrant household**

Country	
China	
Pakistan	-.126
India	-.431
Nepal	.331
Rapid onset hazard [slow onset hazard]	.315
Difficult to find job in community	.176
Education level of household head [no education]	
Primary	.012
Secondary	.072
Higher	-.134
Economic assets [4th quartile]	
1st quartile	.173
2nd quartile	.082
3rd quartile	.187
Own agricultural land (in hectares)	-.008
Social capital	.032
Number of men >14 years in household	.193
Own agricultural land hazard affected	-.142
Hazard-prone livelihood index (past)	-.103
Constant	.448

Notes: N=1,063 households; marginal changes in probabilities; values based on robust probit regression (see Annex 2); reference categories in square brackets

Table A4: **Robust logit regression on household migrant status (non-migrant = 0, migrant = 1) by hazard type**

Country	Rapid onset hazard	Slow onset hazard
China		
Pakistan	.314	-1.695
	(.742)	(.978)
India	-2.616***	xxx
	(.685)	
Nepal	2.272*	1.735**
	(1.104)	(.612)
Hazard severity [less severe]		
Moderately severe	-.542	.052
	(.627)	(.845)
Very severe	-.468	2.430**
	(.772)	(.928)
Difficult to find job in community	.842	xxx
	(.454)	
Education level of household head [no education]		
Primary	.140	-.194
	(.373)	(.302)
Secondary	.345	.140
	(.496)	(.223)
Higher	-1.271	-.371
	(.687)	(.343)
Economic assets [4th quartile]		
1st quartile	.698	1.019
	(.423)	(.586)
2nd quartile	.222	.695**
	(.344)	(.268)
3rd quartile	.664	1.148**
	(.500)	(.395)
Own agricultural land (in hectares)	-.023	-.049
	(.035)	(.026)
Social capital	.104	.634
	(.112)	(.492)
Number of men >14 years in household	.753***	1.104***
	(.164)	(.139)
Own agricultural land hazard affected	-.877**	-.524
	(.321)	(.310)
Hazard-prone livelihood index (past)	-.556	-.631**
	(.488)	(.243)
Constant	1.511	-.382
	(1.020)	(.611)
Pseudo R^2	.35	.28

Notes: N=602 households (rapid onset hazards), 461 households (slow onset hazards); weighted analysis; clustered according to 29 (rapid onset hazard) and 11 (slow onset hazards) sample units; robust standard errors in parentheses; reference categories in square brackets
xxx=dropped (cases/reference categories do not exist)

*** α<.001, ** α<.01, * α<.05

Table A5: **Robust probit regression on household migrant status (non-migrant = 0, migrant = 1) by hazard type**

Country	Rapid onset hazard	Slow onset hazard
China		
Pakistan	.119	-.982
	(.419)	(.586)
India	-1.596***	xxx
	(.403)	
Nepal	.997	.975**
	(.588)	(.363)
Hazard severity [less severe]		
Moderately severe	-.286	.046
	(.384)	(.498)
Very severe	-.261	1.362*
	(.448)	(.541)
Difficult to find job in community	.516*	xxx
	(.252)	
Education level of household head [no education]		
Primary	.082	-.067
	(.210)	(.172)
Secondary	.223	.104
	(.282)	(.120)
Higher	-.690	-.174
	(.366)	(.190)
Economic assets [4th quartile]		
1st quartile	.439	.593
	(.252)	(.314)
2nd quartile	.146	.403**
	(.200)	(.155)
3rd quartile	.358	.688**
	(.282)	(.214)
Own agricultural land (in hectares)	-.013	-.026**
	(.020)	(.009)
Social capital	.069	.297
	(.062)	(.204)
Number of men >14 years in household	.426***	.623***
	(.085)	(.087)
Own agricultural land hazard affected	-.501**	-.296
	(.180)	(.183)
Hazard-prone livelihood index (past)	-.281	-.357*
	(.274)	(.157)
Constant	.821	-.266
	(.571)	(.389)
Pseudo R^2	.35	.28

Notes: N = 602 households (rapid onset hazards), 461 households (slow onset hazards); weighted analysis; clustered according to 29 (rapid onset hazard) and 11 (slow onset hazards) sample units; robust standard errors in parentheses; reference categories in square brackets
xxx = dropped (cases/reference category does not exist)

*** $\alpha<.001$, ** $\alpha<.01$, * $\alpha<.05$

Table A6: **Marginal changes in probability of becoming a migrant household by hazard type**

Country	Rapid onset hazards	Slow onset hazards
China		
Pakistan	.032	-.289
India	-.575	xxx
Nepal	.171	.366
Hazard severity [less severe]		
Moderately severe	-.091	.018
Very severe	-.082	.468
Difficult to find job in community	.115	xxx
Education level of household head [no education]		
Primary	.023	-.026
Secondary	.058	.041
Higher	-.242	-.065
Economic assets [4th quartile]		
1st quartile	.102	.233
2nd quartile	.039	.159
3rd quartile	.087	.268
Own agricultural land (in hectares)	-.004	-.010
Social capital	.019	.117
Number of men >14 years in household	.100	.244
Own agricultural land hazard affected	-.169	-.108
Hazard-prone livelihood index (past)	-.089	-.128
Constant	.794	.395

Notes: N = 602 households (rapid onset hazards), 461 households (slow onset hazards); marginal changes in probabilities; values based on robust probit regression (see Table A); reference categories in square brackets
xxx = dropped (cases/reference category does not exist)

*** α<.001, ** α<.01, * α<.05

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The International Centre for Integrated Mountain Development, ICIMOD, is a regional knowledge development and learning centre serving the eight regional member countries of the Hindu Kush-Himalayas – Afghanistan, Bangladesh, Bhutan, China, India, Myanmar, Nepal, and Pakistan – and based in Kathmandu, Nepal. Globalisation and climate change have an increasing influence on the stability of fragile mountain ecosystems and the livelihoods of mountain people. ICIMOD aims to assist mountain people to understand these changes, adapt to them, and make the most of new opportunities, while addressing upstream-downstream issues. We support regional transboundary programmes through partnership with regional partner institutions, facilitate the exchange of experience, and serve as a regional knowledge hub. We strengthen networking among regional and global centres of excellence. Overall, we are working to develop an economically and environmentally sound mountain ecosystem to improve the living standards of mountain populations and to sustain vital ecosystem services for the billions of people living downstream – now, and for the future.

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