



# Withdrawing from Agrarian Livelihoods: Environmental Migration in Nepal

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**Abstract:** Although about two-thirds of Nepalese families depend on agriculture as their major source of income, the agriculture is mostly rain-fed and it has been adversely affected by water hazards and the subsequent degradation of resources. Based on case studies from three different geographical regions in Nepal, this research examines how environmental factors cause decreasing crop production and push people to abandon agriculture and accept emigration for employment. The research findings suggest a chain of push factors starting from drought or erratic rainfall causing water hazards, which impacts on depletion of crops and livestock, losses in income and employment and increased human mobility and emigration. The paper argues that the Government of Nepal and development partners can be more effective in enabling agrarian families to cope with the water hazards and shocks by formulating pro-poor mitigation and adaptation policies and strategies, focusing both on 'rapid-onset' and 'slow-onset' water hazards.

**Keywords:** Agriculture; Environment; Migration; Human mobility; Nepal; Water hazards

## Introduction

Migration is a regular and complex

phenomenon with many different drivers, including poverty, unemployment, inadequate economic opportunities, conflict, increased environmental hazards, absence of basic health and education facilities, and is rarely brought about by a single cause (Kniveton et al. 2008). However, recent case studies found water hazards and subsequent depletion of agriculture production to be the leading contributing factors causing migration of agrarian Nepalese families. In Nepal, the livelihood of more than 66% of the population depends on subsistence agriculture (GoN 2010b; UNDP 2009) although 60% of agriculture land is rain-fed (CBS 2008) and over 80% of people live in rural areas (GoN 2010c). Therefore, when there are environment-induced impacts on agriculture, the livelihoods of these agrarian families are immediately challenged and they are forced to explore alternative options. Hence, emigration of young people, who supply the vital hands in labour intensive agriculture, to search for employment becomes an option for many agrarian families. The increased number of households which are receiving remittances confirm the escalating level of migration, with households receiving remittances having increased from 24% in 2004 to 56% in 2011 (CBS 2004, 2011; Kollmair et al. 2006). Out of them, a total of 11% households have received remittance from Nepal, 17% from India

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and remaining 72% from other countries (WB 2011).

There are other reasons for migration in Nepal, including growth of population, inadequate wages in the domestic labour market, decreased land productivity, and conflict (Gurung 2000; Khatiwada 2010; Tianchi and Behrens 2002). Some research describes development-induced reasons, such as big construction projects, as one of the key drivers of migration, together with oppressive land and labour practices at home. Other research mentions network of people, medical treatment, and marriage as supplementary factors (Thieme and Wyss 2005). Nevertheless, Gurung (2000) argues inability of expansion of the agricultural sector, a large employment provider in Nepal, is one of the key reasons; Dulal et al. (2010) identifies decline in agriculture production because of frequent flooding; and Banerjee et al. (2011) state that variations in the frequency and duration of rains coupled with prolonged drought is the main reason. The later describe water hazards like flash floods and landslides as rapid-onset hazards

and droughts and water shortages as slow-onset hazards, with emphasis on explicit and pronounced rapid-onset hazards as the key factors. Although economic reasons are considered an important cause, research in the Hindu Kush Himalayas concludes that water hazards are an important influence on the decision to emigrate for work among nearly 80% of households in the region (Banerjee et al. 2011).

This research investigates the experiences of agrarian families from three research clusters, representing one from each of the mountains, hills and plains – Lamra in Jumla district in the north-west Mountains; Bangsing Deurali in Syangja district in the western hills; Tikapur in Kailali district in the far western plains, respectively (Figure 1). In these areas, agriculture is adversely affected by the unexpected short-run and long-run factors as explained by Banerjee et al. (2011) and Beine and Parsons (2013). Major issues for each research cluster were - erratic rain/snow fall and drought in Lamra (the mountains), a landslide in Bangsing Deurali (the hills) and a flash flood in

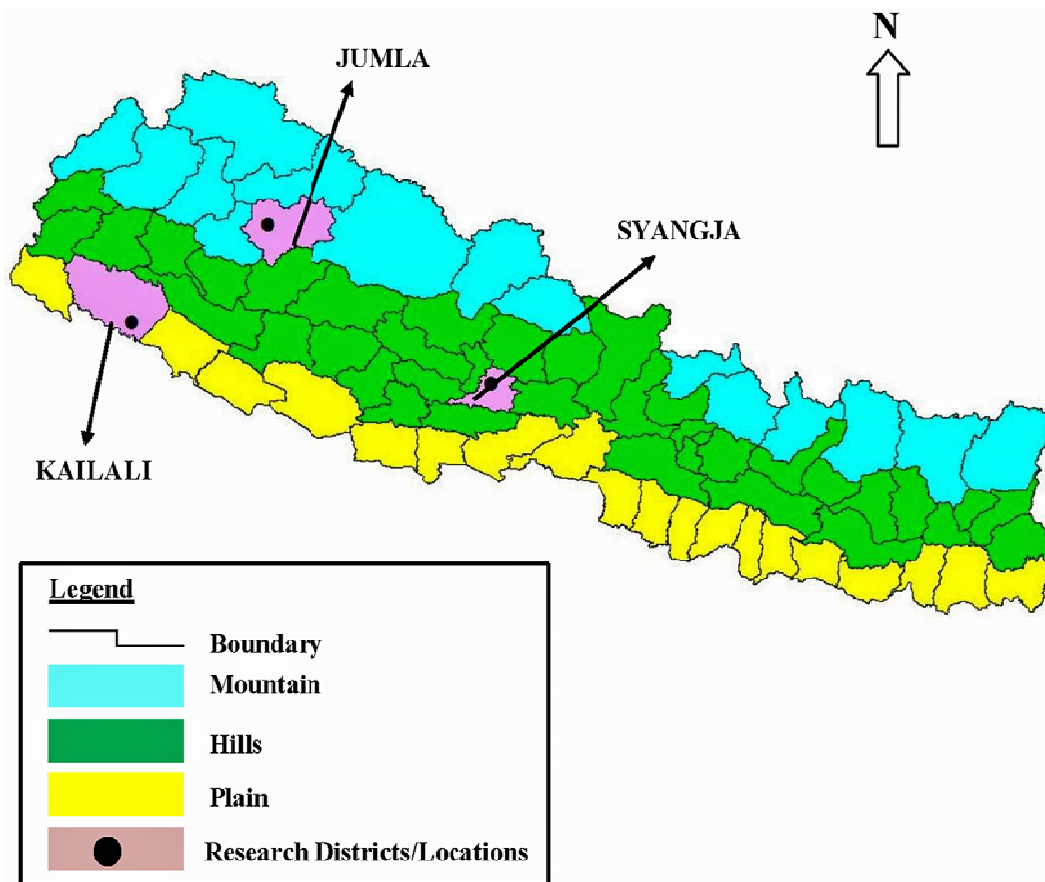


Figure 1 Locations of field research sites in Nepal.

Tikapur (the plains). These cases were selected to understand the similarities and differences of water hazards in three different topographic locations.

The research followed qualitative methods of data collection, including in-depth interviews of 30 persons from each research site (n=90 persons), focus group discussions (n=15 events; 5 at each site), series of participant observation and the policy analysis. The research participants were selected purposively, representing members of local communities of different well-being groups, family members of emigrants, members of local institutions, network members and service providers. The well-being ranking was conducted based on local criteria of relative poverty to differentiate research participants into three groups – poor, medium and rich (Chambers 1994; Mosse 1994; Scoones 1995). This ranking helped to understand and analyze choice, pattern and duration of migration by well-being groups. Focus group discussions were carried out in each research cluster with women, hazard affected and disaster-prone people. Participant observations were conducted at community group meetings and at hazard affected sites. The research was conducted in 2010 by the authors and the data were analyzed using NVivo10. The field findings are reviewed in relation to the 2011 national census, existing policies and practices, and well-being status of research participants.

This article presents an overview of theoretical perspectives on migration, environmental migration and an analysis of empirical cases from the three study sites, followed by a discussion of key findings and conclusions with policy implications.

## 1 Migration Scholarship

The migration studies are mostly focused on why people migrate. Lee (1966) defines migration as “permanent or semi-permanent change of residence” and it is influenced by the three key groups of factors – push factors associated with the origin; pull factors connected to the destination; and human factors related to the persons who decide to migrate. Starting from Ravenstein in 1889, “the undisputed founding father of migration

theory” (Arango 2000), push and pull factors are regularly analyzed in migration debate.

New economic theory argues human migration as ‘calculative strategy’ (Stark and Bloom 1985) and that decisions are made, in consultation with household or family members, based on the perceived relative comparison of benefits (Massey et al. 1993). Furthermore Massey et al. (1993) point out that continuation of migration is based on interpersonal ties through which networks are formed between former migrants and non-migrants or migrants and non-migrants based on kinship, friendship and shared community of origin (Massey et al. 1993). Shah (2000), giving example of network, states that the network plays a significant role in selecting migration channel as well as in negotiating remuneration at destination. He argues that the person who migrates with friends and families make more income than who come through agents. In exchange for abdication of family responsibility, the migrants share their income with family members and the remittance functions as co-insurance. Thus, the diversification of labour is an important strategy for agrarian families which do not have alternative mechanisms to adapt the water-hazards.

Most of the human migration theories revolve around economic, demographic, social, political, institutional and anthropological perspectives, accounting environmental conditions as a silent determinant in migration decision making (Massey et al. 2010). However, many scholars (Banerjee et al. 2011; Massey et al. 2010; Warner 2010) find the impact of environmental factors under-researched, although, it is estimated that there are possibilities of mass displacement of people as a result of environmental hazards. Warner (2010), for example, states that natural phenomena, such as environmental degradation, floods, landslides, hurricanes, or droughts adversely affect social interactions and contribute to human mobility. However, the socio-economic status of individuals and families largely determine sensitivity to livelihoods, and adaptive capacity which ultimately help to make migration decisions (Adger 2006; Gentle et al. 2014; Ribot 2010).

Some scholars (Black et al. 2011; Hugo 2010; Massey et al. 2010) define environment as one of the major direct and indirect factors of human migration. Environmental degradation and scarcity

of natural resources, including water and forest, are outlined as direct environmental push factors (Goria 1997; Hitztaler 2004; Shrestha and Bhandari 2007) whereas decreased land productivity and subsequent lowered agriculture production are explained as indirect factors in emigration (Chapagain et al. 2009; Feng et al. 2010; Warner et al. 2010) which are intertwined with economic issues (Adamo 2010).

Among these theoretical frameworks, this research looks into the environmental theory, with a focus on water hazards as explained by Banerjee et al. (2011), investigating both the rapid-onset hazards and slow-onset hazards. The former includes flash flood, flood and landslides whereas the later comprises of drought and water shortages. Water hazards and their subsequent effects on agriculture-based income are important in Nepal because the livelihoods of two-thirds of the population depend on rural agriculture, mostly rain-fed, and notably, 85% of emigrants are from families in this population segment (CBS 2012; GoN 2010b; UNDP 2009). Similarly, the agricultural sector, which has traditionally been the largest contributor to Gross Domestic Product (GDP), has decreased from 39% to 32.8% between 2004/05 and 2008/09 (GoN 2010b). Furthermore, agrarian families are vulnerable to climate change in Nepal with 10 million people increasingly at risk and one million at risk annually from floods, landslides and droughts (MoE 2010). Correspondingly, the unpredictable weather patterns, including warmer and drier winters, droughts, changes in stream flows, erratic monsoon rain and intense precipitation are the major causes of decreasing agricultural production in Nepal (MoE 2010; Regmi 2007).

## 2 Policies and Gaps

Nepal does not have a formal emigration policy. To manage international migration of Nepalese workers, after the promulgation of the Foreign Employment Act in 1985 (HMG 1985), the Government of Nepal (GoN) promulgated a new Foreign Employment Act in 2007 and subsequent regulations in 2008 (GoN 2007, 2008). In addition, the GoN has been making some occasional policy decisions. For instance, between 1997 and 2008,

the Government imposed restrictions on women in their employment in the Persian Gulf (AI 2011). Similarly, the GoN has made a decision in 2012 and restricted women to take employment in the Gulf until they become 30 years old (GoN 2012). However, some research find that these restrictions have created scope for trafficking of women from Nepal (AI 2011) leading to subsequent data gap. The census report, for example, states that the proportion of women among Nepalese people living outside of the country is 13% of the total emigrants (CBS 2012), whereas the Foreign Employment Department data claims the share of women only as 2.32% (DoFE 2011).

Similarly, the GoN has formulated the Nepal Environment Policy and Action Plan (HMG 1993). The plan has been prepared in response to "...maintaining a balance between economic development and environmental conservation, which culminated in the UN Conference on Environment and Development in 1992" (HMG 1993). However, the policy lacks provision for environmental migration and management of water related hazards in agriculture. Further to this, the GoN has promulgated policies on emission regulations and environmental protection, called the Environmental Protection Act 1997 and Regulations 1999. However, these policies focus on carbon emissions produced by vehicles in urban areas. Similarly, the government developed an Agriculture Perspective Plan (APP) in 1995 and National Agriculture Plan (NAP) in 2004 without mention of climate change and long term environmental hazards on agriculture (Sova and Chaudhury 2013).

Although agriculture is stated as a high priority in Nepal, the existing policies do not have sufficient provisions to mitigate the impacts of environmental changes on agriculture and the subsequent emigration of people. The Three Year Interim Plans (2007 and 2010) have recognized climate change as the major concern but there is no specific plan to address the impacts on agriculture. The Three Year Interim Plan 2010 has provision for climate change resilience technology which is heavily referenced to forest and soil conservation, drinking water and sanitation, water-induced disasters prevention and alternative energy but does not mention agriculture development and diversification (GoN 2011b; Sova and Chaudhury

2013). Further to these, the Nepal Agriculture and Food Security Country Investment Plan 2010 is considered the most progressive document as it has identified irregular rainfalls, frequent floods and droughts, increased incidence of landslides and waves of extreme cold as the major food security issues and challenges (GoN 2010a). However, the document claims adaptation to climate change as the single solution without giving specific reference to the effect of rapid-onset water hazards to agriculture. All these documents fail to mention the impacts of human migration on agriculture. Furthermore in 2010, the GoN prepared a National Adaptation Program of Action (NAPA) on climate change. Similarly, this plan does not analyze the relationship between climate change and migration. These findings explain that the policy priorities of the GoN are not necessarily synchronous with the issues of large majority of Nepalese population who depend solely on agriculture-based livelihoods and income.

### 3 Nepalese in Migration

Nepal has a long history of emigration for employment with the recruitment of Gurkha in the British Army, starting from 1815 (Seddon et al. 2002). However, mass emigration started only after the restoration of democracy in the 1990s, with an open political environment and access to information. Between 2001 and 2013, the number of emigrants has increased by 13 times and remittances to the country increased by 35 times (MoF 2013; World Bank 2010, 2011). As a result, the ratio of remittances to Gross Domestic Product (GDP) has increased from US\$147 thousand in 2001 to US\$5.2 billion, about 25% of GDP in 2013 (Shishido 2009; MoF 2013; WB 2010, 2011). Among the remittance earners, the share of emigrants from rural families is 85% compared to 15% from the cities (CBS 2012).

The 2011 Population Census in Nepal shows negative population growth in 27 hill and mountain districts between 2001 and 2011 and young people's migration attributed as one of the key reasons (CBS 2012). A decrease in agricultural production and farm size as well as inadequate economic opportunities are reported as some of the key reasons for declining rural population and

rural-urban migration (Maharjan et al. 2012).

Many scholars have differenced migration patterns by wealth status of people. The seasonal migration to India, for example, is made by poor people (Kollmair et al. 2006; Gill 2003). These people usually move out from their villages for less than six months of the year and work in brick kilns or agriculture farms, either as security guards or labourers. The migrants pay a range of money, from US\$ 10 for a migration to India to around US\$ 9130 for migration to Japan. Therefore, poor does not have access to expensive ventures as opposed to middle or higher class of people who can afford to these expensive destinations (Thieme and Wyss 2005).

### 4 Water Hazards and Migration: Cases

The 2011 population census, based on household survey, finds a total of 1.9 million Nepalese people living and working outside the country at the time of census, except for medical treatment, pilgrimage and other similar causes, as opposed to 762 thousand in 2001. Out of 1.9 million, 5% are from the mountain, 51% from hill and 44% from plains districts (CBS 2012). The data shows that the emigration is high from the hills which have sloping landscape and mostly rain-fed agriculture, and from the plains, which have been the victim of flash floods in recent years. Similarly, the agricultural production, mainly rice, wheat and corn, has fallen by an average of 10% in 2010 in these areas, with a resultant decline in agriculture-based income for agrarian families (WB 2010). The water hazard is one of the major factors that contribute to increase migration of people. Agrawala et al. (2003) ranked the impact of climate change in Nepal significantly higher than many other countries.

Flash flooding is a big contributor to depleting agricultural production in Nepal. The flooding in the Koshi river basin in 2008, for example, displaced more than 65 thousand families, thus forced them to abandon their agriculture land (NCVST 2009). The flood eroded thousands of hectares of agricultural land and destroyed paddy crops. In the monsoon of 2013, the flash flood of the Mahakali River swept away hundreds of hectares of agricultural land together with 77

buildings from one of the district headquarters, and displaced 2.5 thousand people (ICIMOD 2013).

Landslides similarly, have major agricultural impact although there are multiple contributing factors leading to these occurrences (Yamaguchi 1967). The 2011 Nepal Disaster Report states erratic rainfall as one of the major causes of landslides in the country (GoN 2011a). The report identifies a total of 2705 landslide events and 4,327 deaths with six hundred thousand affected people. The report also names landslides and flash floods as the most common disaster in Nepal (GoN 2011a).

Likewise, drought has been causing many adverse effects on rain-fed agriculture in Nepal. More than 150 drought events occurred in Nepal from 1971 to 2007 affecting more than 330 thousand hectares of agricultural land (NSET 2009). The winter drought of 2008-09 placed more than two million people, about one tenth of the total population, at high risk of food insecurity (WFP 2009). These droughts destroyed crops across the country with higher impacts on the families from the mid and far western districts of Nepal. According to the World Food Program (WFP), the winter drought of 2008-09 in Nepal reduced the production of wheat and barley, the major winter crops, by 14% and 17% respectively, resulting in an increased emigration from the areas (WFP 2009).

Along with these findings, in the following sections this paper examines three different cases of water related hazards: a) erratic precipitation and droughts in the mountains; b) landslides in the hills; and c) flash flooding in the plains, and the subsequent experiences of the people.

#### **4.1 Erratic precipitation and droughts in the mountains**

For many years, Lamra villagers, in the mountain district of Jumla, have had a trend of seasonal migration to India as one of their major strategies to boost livelihoods. These people migrate to Indian cities, either following their colleagues or repeating the same employer that they had employment in the earlier years. In some cases, labour agents coordinate between potential employer and migrants, and take these people to an agreed work destination. The potential income is another factor that pulls them to a particular

destination if they find information about remuneration in advance. These people usually spend about half of the year in India and there was at least one emigrant per family in over two-third of households in 2010. The seasonal migration to India co-relates to the weak adaptive capacity of the families that cannot afford an expensive venture. Among these households, only 20% of families had food sufficiency throughout the year from their agricultural land, although all of them stated agriculture to be their major source of livelihood.

The major crops in the area are rice, barley, maize, potato and millet. Farming is mainly based on rain or snowfall. The area is a unique place for rice cultivation where it is grown up to an altitude of 3000 metres, probably at the highest altitude globally (Paudel and Thakur 2009; Uhlig 1978). However, rice production in this high altitude area requires a specific finite period for planting and a one-month delay in seedling production and planting results in crop failure for the year. In recent years, different research has identified repeated crop failure in the district due to prolonged drought and erratic rainfall (Regmi 2007; Gentle and Maraseni 2012). This was unanimously confirmed by all participants from five focus group discussions conducted in this study. One research participant woman said, "We have replaced paddy with millet seedlings over the period of three years because of inadequate water". Snowfall is another important aspect to maintain soil moisture in Lamra where they have sparse winter rain. However, all research participants of Lamra confirmed that a reduction in the amount and duration of snowfall in recent years has resulted in less moisture on agricultural and forest land causing decreasing production of crops and degradation of rangelands. The changes in rain and snowfall pattern have resulted in decreased production of potato, wheat, barley, forage and non-timber forest products in the area. One research participant added, "I have lost potatoes and wheat, the winter crops, because of inadequate snowfall. I am not sure what I am going to feed my family and children and how long we can live here if the production decreases continuously". Furthermore, the residents of Lamra reported a gradual drying of springs, which are the only source of drinking, washing and cleaning water in

the village.

Because of drought, the rangeland and forests were adversely affected, resulting in inadequate fodder for livestock and decreased production of non-timber forest products (NTFP) such as *Nardostachys grandiflora*, *Picrorhiza scrophulariflora*, *Rheum australe*, and *Valeriana jatamansii*. The collection and trading of NTFP is one of the strategies of poor people to generate income and supplement agriculture gaps. Nonetheless, most of the research participants reported that they have a decreased number of livestock in the area following prolonged drought and shrinkage of grazing land. A community leader in Lamra said that the changing weather and decreasing production have been pushing more families and individuals to Indian cities. One research participant, who was in his mid-eighties, said that in recent years he has observed decreased rain, increased drought and less snow together with an increased flow of young people to Indian cities as seasonal migrants in recent years. He said, "I have never seen such changes in rain and snow in my life - they are getting unpredictable. Probably, we have not been faithful to God and the Almighty is unhappy with the people here." He shared his frustration that the young people do not have their faith and respect for god.

#### 4.2 Increased flash flood in plain land

In the plains district of Kailali, flash floods with subsequent effects on agriculture have modified the livelihoods of rural agrarian families. Because of this, family members from many households have either taken temporary work in India or the whole family has been displaced and moved to a new area. While moving to a new area, the destination was determined together with neighbours as the large numbers of families were displaced together because of flash floods. Finding a resettlement place at the government land in Kailali was possible because of the collective efforts of these re-settlers. The families who were not part of these actions had to take loan from money lenders to find a place.

One respondent from Kailali, for example, had to take a loan from moneylenders after his paddy field was flooded in 2008. However, he could not return the loan amount to the moneylender and he

had to quit his land, which was given as the collateral. After this, he started pulling rickshaw (three-wheeled passenger cart) in a nearby urban centre called Tikapur. He said, "We have been made landless and illegal settlers after my land was flooded and I could not take my land back that was given as the collateral to a money lender."

During the study, a total of all 44 research participants, who had been victim of flash flooding, reported a range of changes in weather patterns over the period, such as delayed and/or erratic monsoon, increased flooding, higher temperatures and increased storms in the area. One community leader said, "On the one hand, the regular rainfall has decreased and on the other, big floods wash our paddy a few weeks after planting". Similarly, a total of two-third of research participants reported that production had gone down because of floods and delayed planting of paddy and other crops, failure of winter crops like wheat or pulse, damage of crops and fertile land by floods, and increased numbers of pests and insects. In an interview, one of the respondents said, "Each year, rain has delayed planting and the production of cereal crop (called *Masuro*) has been decreasing. If planted in June, it produces more than two metric tonnes per hectare. However, if this is planted in August, it produces about half and if further delayed, it produces foliage with no seed". He questioned himself, "How do I feed my children, how can I afford their health care and education, and how do I celebrate festivals?" He had sent his 12-year daughter to work for other and he was exploring options for moving out from the area.

One-third of these families from the plains research cluster had already moved to an urban slum and started living as landless settlers. These families had illegally occupied an old airport and school land, and had constructed their plastic/thatch-roofed huts with hundreds of others who had migrated from other areas of the region.

In another interview, a research participant said, "Some landless people were affected by a flood in 2009. They were living on a piece of government land between the *rani kulo* (main canal) and an offshoot to the village. The water flooded over the banks and their houses, made of unbaked mud bricks, collapsed." During the research, a total of 25 families were living at the same place, under plastic huts and had some corn

plants around their sheds. However, their agricultural land was full of silt that came along with the flood. A total of 90% of research participants from this group had had at least one family member out of home in a search of a job, either to nearby urban centres or to Indian cities.

### 4.3 Landslides in the hills

The third research site, a hill district of Syangja, the people of Bangsing Deurali had agriculture land and good production of rice, corns, wheat and vegetables. They used to sell some of their products at the local market. However, they witnessed a landslide close to their farmlands about five decades ago. One of the research participants said, "We noticed the landslide in 1958 for the first time. It started from our cultivated land, on a sloping hill, just below our village. Gradually, the landslide expanded, risking the village. In 1986, it dragged out a part of the village during pouring rain at night". As reported, a total of seven families had to leave the village permanently, and an additional 120 families remained at risk.

Following the landslides, the families of Bangsing Deurali had started sending increased number of emigrants, usually one of their family members, to international employment, as a means of boosting livelihoods. Therefore, they had sold part of their properties to pay for their travel and other associated costs as the remittance could give the families an assurance to access an alternative source of income. As Adger (2006) and Ribot (2010) argue, the socio-economic status of these migrants had determined their migration destination, mostly to middle income countries, where they had to pay relatively higher than Indian and lower than developed countries' migration.

As this was a planned move, the potential migrants had contacted with the recruitment agents and companies for their migration. The migration destination was decided based on remuneration, network with friends and neighbours, and the cost of migration. However, in this whole process, the role of migration industry had become crucial to determine the type of work and destination. Thus, the migration of a family member had been one of the determinants of livelihoods of the family members living behind.

A research participant said, "Following the permanent migration of seven families, many other have switched their occupation from agriculture and have started migrating to the Gulf". A focus group discussion identified that a total of 98 young people had migrated from the village to different countries in 2010, whereas it was only 59 in 2007. Further to this, about half of the families have bought either a house or a plot of land in nearby cities as an option to move from the village. The purchasing of the house or the plot of land was possible because of the remittance that was sent by the emigrants to their families. One of the respondents from the areas said, "Yes, my brother went to Saudi Arab to work. He does not want to continue living in the village because we are in danger of landslides. Nonetheless, I do not see migration as an option. Rather I consider this as a failure of our government. We should be able to control the landslides and mitigate the risks." Echoing this, many research participants do not consider emigration as a solution to their problem. However, they are frustrated with their situation and are opting for foreign employment as an adaptation strategy.

The results demonstrate that three areas had differences in the forms of water hazards, that is, floods in the plains, landslides in the hills and drought in the mountains. However, the economic well-being, options at home and social network of the families were found to be responsible to decide the destination and duration of the migration. Majority of the emigrants, for instance, from Lamra migrated to India; Tikapur to nearby towns and cities; and Bangsing Deurali to the Gulf States.

## 5 Coping with and Adapting to Environmental Hazards

This research identifies chain of ecological migration, basically of three natures. A summary of coping and adaptation strategy of the research participants is given in Table 1. These migrations are caused by water hazards affecting agricultural practices, therefore, characterized as 'ecological migration' (Howard 1998 cited in Alscher 2011).

First, as a result of diminishing agricultural yield and income, usually a family member of productive age migrates to find employment, most



**Table 1 Water related hazards and emigration patterns in the research area**

Research clusters	Geographic location	Water hazard issues	Major livelihood impacts	Coping/adaptation strategy	Migration drivers
Lamra, Jumla district	Mountains	Mostly slow-onset hazards due to erratic snow/rain fall, drought	Decreased agriculture production, food scarcity, resource degradation	Mainly seasonal migration to India	Affordability, network, traditional knowledge and practices
Bangsing Deurali, Syangja district	Hills	Mostly rapid-onset hazards due to erratic rainfall and landslides	Threat to settlements and agriculture land	Mostly international employment, and gradual family migration to urban areas	Information, affordability, network
Tikapur, Kailali district	Plains	Mostly rapid-onset hazard due to flash flood	Land degradation, threat to settlements, and decreased crop production	Temporary migration to India, displacement to public and fallow lands	Landlessness, affordability, network

often going to middle income countries or to Indian cities based on their geographic locations (Table 1). A community leader of Syangja said, “Some boys migrated to the Gulf and started sending remittances to our village and many other from family, neighbours and relatives, followed their footsteps. Remittances have been an alternative to the declining agriculture in our village.” Thus, migration has turned into a family strategy to find an employment to cope with the water hazards.

As a second step, whole families started exploring options to move out from their place of origin. In Bangsing Deurali, for example, the landslide prone families had bought land or a house in safe areas after the families started getting remittances. This provided choices among families to leave the vulnerable place and find off-farm activities. Conversely, the flash flood victims in Kailali had occupied government land together with other landless settlers as an option.

As the third step, in Kailali and Syangja, the rapid-onset hazards and subsequent depletion of agriculture led to migration of the whole family to the new place. In contrast, this did not apply to the families in Lamra because they did not experience rapid-onset water hazards. In Lamra, with the slow-onset hazards, the need for income had resulted in short-term family migration to Indian cities or Nepalese urban centres, at most.

In all research sites, as identified by Wodon and Liverani (2013), families in Nepal have made efforts to counteract livelihood stress by selling

labour, using their savings, selling their assets and livestock and taking children out of school. The first effort of poor families to cope with the water hazard was to sell their labour to neighbours. This could secure them some food grains to feed their family members. About 82% of disaster victims reported this as their immediate option. More than half of the research participants said that they made some changes in household practices, including reduced consumption of food. However, the coping practices of local people varied according to their wealth status, where those with larger land holding and access to alternative income fared better. Poor families in Jumla and Kailali, for example, had taken their children out from schools and sent them to work for others as ‘child labour’. In all three areas, 32% of households had sold their seed stock and livestock. However, relatively well-off families, for example, used their savings and shifted their farming to short-term cash crops including vegetable farming.

The poor families in all three areas were in debt because of the water hazards. Seventy-eight per cent of the poor families in the research sites were in debt to buy food, medicines and household supplies. Mostly, the loans were taken from local moneylenders, with very high interest rates, ranging from 24% to 60% per year. This happened while they could not get employment and alternative income. In Kailali and Jumla, the poor families reported that their loan amount had increased during the last three years.

Similarly, poor families have been facing

difficulties in accessing post-disaster support, although, there were some ad hoc assistances. About 67% of the poor research participants did not get these. One landless woman in Kailali said that she could not get these services because she was living on public land. After her house was washed away, she was considered as a temporary resident because she did not have any evidence of permanency in the area. As a result, she had to borrow loan from a local moneylender who had taken her 11 year old daughter as bonded labour. These circumstances forced her and many people in the area to leave their families to find an alternative employment.

The migration destination differed based on affordability of families. In Jumla and Kailali, the first destination was India. However, most of the people from Syangja migrated to Qatar, Bahrain, Korea, Malaysia and the United Arab Emirates (UAE), paying big amounts to recruitment agencies. These families were interested in overseas labour migration which could give them higher income. The people in Syangja could take big loans from moneylenders because they had their productive land as the collateral. In contrast, the poor people in Kailali did not have any land as collateral and moneylenders in Jumla were not interested in the land. Jumla is one of the remotest districts with no road connection and very low productivity.

These cases provide evidences that the policies in Nepal are neither helping agrarian families to cope with the water hazards nor in adaptation to the changes that result. There are gaps of services to protect agricultural land from the water hazards; and post-hazard services are mostly ad hoc and do not reach the poor people who are in need. The following section presents some research-based policy options.

## 6 Policy Options

This research finds that the adverse effects of water hazards on agriculture have been a key factor which forces agrarian families, or members thereof, to abandon, or radically modify their practice of agriculture. This is mainly because the agriculture in Nepal is mostly rain-fed with over 60% of agricultural land unirrigated (CBS 2008). In addition to heavy dependency on rain, the

agriculture has been the victim of flash flooding and landslides, affecting the more than two-thirds of the population dependent on agriculture-based livelihoods (GoN 2010b). These facts expose serious policy gaps in Nepal for prevention and protection of agrarian families from water hazards as well as to manage human migration from the country. Therefore, this article brings four major policy recommendations to address these concerns and plan for the future.

Firstly, the role of safety nets is important to the agrarian families who depend on rain-fed agriculture which is vulnerable to water hazards. However, the existing GoN policies including NAPA (MoE 2010) and climate change policy 2011 do not have direct link between water hazards and agriculture and migration, and tend to concentrate only on post-disaster, mostly discretionary, relief actions. These policies require broader perspectives on use of remittances to facilitate preventative strategies to reduce water hazards, including promotion of productive use of remittances. Specifically, there is a need to support farmers with drought or flood friendly crop varieties addressing both the rapid-onset and slow-onset hazards; diversifying agricultural crops and practices; climate forecasting; disaster warning mechanism; crop insurance and development of ensured markets. Contextual knowledge would have been generated through site specific applied research to develop appropriate technology and practices with farmers.

Second, the farmers have been victims of flash floods and landslides, as well as facing drought in the same area in different seasons of a year. There are opportunities to enhance farmers' skills and promote local technologies in water harvesting, storage and management. Further works that promote diversification of livelihood options support farmers to move beyond subsistence and hazard-prone agriculture practices.

Thirdly, the impacts of water-induced disasters are not always local and the risks are much higher to women, children, the elderly and poor families, who are exposed to the water hazards, than well-off males living in the same area. In many cases, people living in the plain region are facing unpredictable floods because of rain in the mountains or hills. The flooding in Kailali is an example of this. Therefore, this paper proposes to develop pro-poor policy

focusing on vulnerable people with an investment plan which ensures vulnerability analysis and adaptation planning, together with explicit provisions for the people with specific needs, including upstream and downstream linkages of disasters. The analysis and planning should ensure - a) identification of water hazards, risks, and impacts as well as opportunities for agriculture and people; b) prioritization of strategies and plans; c) proper implementation of preventative actions in advance along with prompt and effective protective responses; and d) reflection upon the policies, strategies and actions through participatory monitoring and evaluation (Wodon and Liverani 2013). There is also a need to mainstream water hazard prevention activities in the development plans at different levels, including local and national governments, and development partners.

Finally, in order to make Nepalese migration safer within country and outside, it is important that the GoN accepts the emigration of people as a natural phenomenon, which should therefore be made smooth and safe. If the policies are discriminatory and do not help to make migration safer, desperate people are likely to be trapped and exploited by human traffickers and smugglers. Similarly, the remittances that the migrants have sent back home, have huge potential to foster investment at the local level with accompanying generation of local employment. The pathways could be to facilitate the safer migration of people both inside and outside the country; assure security and technical backup; and encourage the investment of remittances to diversify agriculture practices.

## 7 Conclusion

Within the first decade of 2000, rural people in all three research areas have observed several changes in rainfall patterns resulting in drought, landslides and floods, which have been damaging the rain-fed agricultural base of rural Nepal. These changes contributed to increasing number of emigrants every year from the agrarian families. The poor people, who could not pay for their migration, moved to nearby cities or to Indian cities at most, as temporary workers. However, the middle class and rich people made longer-term emigration, between three to five years, to middle

income and high income countries, respectively. Once, the family members started getting remittances regularly, this became the stepping-stone to rural-urban migration for the whole family in many cases. Thus a chain migration pattern is created progressing from semi-permanent to permanent; and from agricultural to non-agricultural migration.

Generally, the impact of water hazards affected people and families differently according to their level of affluence. The poorest groups were hard hit by the changes in erratic rainfall, landslides and floods and their subsequent impacts on agriculture because they had dependency on one crop or two, and did not have alternative options to diversify their income. If there was a failure of a crop or if one crop was washed away, they were immediately in debt, usually from moneylenders. Emigration had been the only option to pay the loan and to manage family expenses.

Thus, emigration has been established as an important strategy to cope with water hazards in agriculture and to diversify the sources of family income. This stood as a very complex decision and there were many incidents in which women and children were left behind with additional responsibilities. In addition, the outcomes have spiral impacts both on agriculture and on achieving population balance between rural and urban areas. However, there is a knowledge gap to understand the complex processes and linkages between migration and environment as most of the human migration theories revolve around socio-economic and demographic factors.

To address these challenges, this paper makes some recommendations to the GoN and development partners to formulate farmer friendly agricultural policy to address both the rapid-onset hazards and slow-onset hazards. In addition, this research recommends policy framework to manage rain, ground/river and underground water for agricultural purposes. Similarly, development of policies to enhance local people's ability to analyze vulnerability and develop community based adaptation are recommended. More importantly, there is need to accept peoples' movement as natural phenomena and the policies should facilitate safer migration of them. The policies that create environment to invest remittances in agriculture would help agrarian families to

diversify their agronomy.

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