

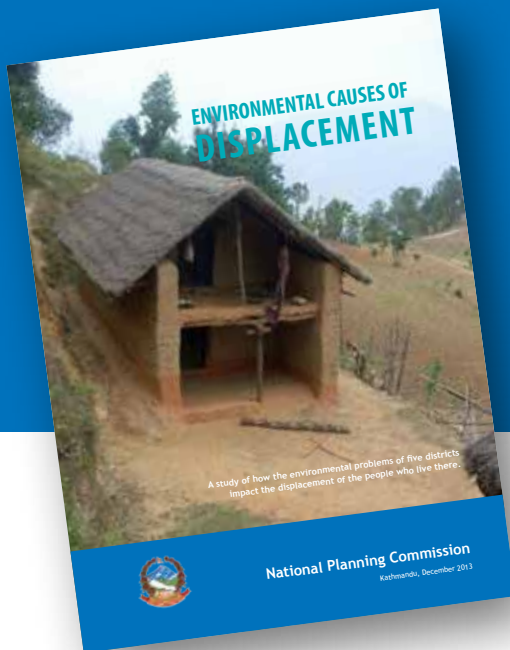
ENVIRONMENTAL CAUSES OF DISPLACEMENT

A study of how the environmental problems of five districts impact the displacement of the people who live there.



National Planning Commission

Kathmandu, 2013



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with support from
the PEI Programme of the

**United Nations Environment Programme and
the United Nations Development Programme**

Kathmandu
December 2013

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National Planning Commission

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ABOUT PEI NEPAL

The Poverty-Environment Initiative (PEI) is a UNEP/UNDP programme. PEI in Nepal supports poverty reduction and inclusive development by integrating pro-poor climate and environmental concerns into development planning and economic decision making. The PEI is not designed as a stand-alone project as such but rather it aims to provide a programmatic framework for targeted support to national and local level planning, budgetary and economic decision making processes through ongoing UNDP supported programmes, in particular, Strengthening National Planning and Monitoring Capacity of NPC (SNPMC-NPC) and the Local Government Community Development Programme (LGCDP). At the national level, the PEI helps strengthen the NPC's capacity to integrate environmental concerns of poor women and men into planning, budgeting, and economic decision at national and local level. Similarly, at the local government level, it strengthens capacity of local governance actors and civil society to integrate environmental concerns of poor women and men into planning, budgeting, monitoring, and evaluation at local level by providing technical support to the Ministry of Federal Affairs and Local Development (MoFALD), and District Development Committees (DDCs) and Village Development Committees (VDCs). The PEI Programme Framework complements the existing project documents of the above two projects, which include the stipulated PEI activities in their respective Project Annual Work Plans (AWPs). The PEI in Nepal began from February 2010 and ends in December 2017.



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ABBREVIATION

DWPC	Drinking Water Preservation Committee
IDMC	Internal Displacement Monitoring Centre
NAPA	National Adaptation Programme of Action
NPR	Nepalese Rupees
UAE	United Arab Emirates
UK	United Kingdom
USA	United State of America
VDC	Village Development Committee



Government of Nepal
National Planning Commission
Singha Durbar, Kathmandu, Nepal

Rabindra Kumar Shakya Ph. D.
Vice-Chairman

Ref.:-

Date:..... December 26, 2013

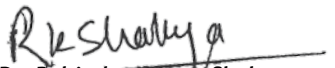
Message

The environmental problems in Nepal are as diverse as its geography and climate. Priorities in addressing these problems in development planning have changed as new evidence emerged over time. In the 1970s, the priorities were soil erosion, floods and landslides, and deforestation. Loss of biodiversity, water pollution, and land degradation were later recognised as essential to address. In the 1990s, with rapid urbanisation, air pollution and solid waste disposal emerged as critical environmental problems in urban areas, particularly. With the turn of the century, Nepal has realized it must confront the long-lasting problem of climate change.

From the beginning, the Government of Nepal has accorded high priority to environmental problems because they have a profound impact on the livelihoods of the millions of people who depend on ecosystem services. The government has formulated policies, strategies and programmes in each of its periodic plans to see that environmental problems are addressed. The results are clear for all to see. Persistent efforts over the last half century have significantly improved the state of environment, particularly that of forests and biodiversity. Almost a quarter of the country's land area has been declared protected area to provide shelter to several endemic and endangered species. However, despite these remarkable achievements, rural areas continue to suffer from soil erosion, floods, landslides and degradation of water resources. In the recent past, environmental stresses have increased, leading to the degradation of ecosystem services in many places. In extreme cases, the result has been so severe that people have abandoned the area they lived in because it was beyond their capacity to deal with the stress. Drought is one stress that has grown drastically in time and space in the last few years.

I am happy to note that this brief study conducted in five districts provides insight into emerging problems of environmental stress. It is high time that these problems be brought to the notice of experts and researchers as well as policymakers so that steps can be taken to understand its implication and find ways to adapt.

I would like to extend my sincere thanks to all those who have contributed directly and indirectly toward developing this report.


Dr. Rabindra Kumar Shakya
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Foreword

In the last few years, requests for water projects to bring water from faraway sources have increased in several districts as local water sources have either been depleted or dried up altogether. Below average monsoon rainfall has been reported for a number of consecutive years in some districts. Springs have dried up and streams have ceased to flow for unknown reasons except when there is rain. The resulting shortage of water for domestic as well as agricultural uses has severely affected the national economy as well as health and sanitation of the communities.

People have articulated and attempted to tackle the water problem in multiple ways. Those in low-lying areas near riverbanks have dug trenches in dry river beds to tap whatever water is available for farming, but those in upland areas who cannot get enough water even for domestic uses have no choice but to move to lowland where water is available. In drought-hit areas of the hills, there are cases of temporary displacement for a few months. In extreme cases, people have been forced to sell off their livestock and land and eventually look for alternate sources of income.

At the same time, the number of victims of floods and landslides has also increased. Though floods and landslides are not as widespread as drought is, the impact on local economies and livelihoods is even more striking. People are made homeless instantly and are forced to find a new place to settle in.

Both the shortage of water, flash floods and landslides have made the momentum of development rather sluggish along with their adverse impacts on the economic growth as well as daily lives. While we need to be more vigilant with regard to emerging problems that hinder development and wellbeing of the people, just identifying these problems is not enough. The problems must be addressed in the planning and budgetary process as well. The effort to mainstream cross-cutting issues such as environmental stress in the planning process requires a coordinated effort as these do not fall under the purview of a single ministry. To accomplish this task, those ministries that are involved in making policies and formulating development plans and programmes in different sectors must be well aware of those issues.

It was this objective—to sensitize the stakeholders—that this study on the environmental causes of displacement was conducted in five districts where floods, landslides and drought have severely affected people's wellbeing. I hope the findings of the study would help to understand how environmental problems undermine achievements made through years of development efforts, and encourage more in-depth studies to help cultivate cross-sectoral collaborative actions to address those problems. This publication would also be useful for the concerned governmental agencies, civil society, researchers, academia, development practitioners, donor agencies, and the private sector in addition to a wider readership. I appreciate the works of our colleagues involved in bringing out this publication.

Yuba Raj Bhusal
Member Secretary
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Acknowledgments

This study of the environmental causes of displacement of people from their place of origin was made possible with the kind support of many individuals and organisations. I would like to extend my sincere thanks to all of them.

Special thanks are due to Honorable Vice-Chairman of the National Planning Commission Dr. Rabindra Kumar Shakya and Member Secretary Mr. Yuba Raj Bhusal for their continued guidance and support. I would also like to express my gratitude towards my colleagues, joint secretaries Pushpa Lal Shakya, Teertha Raj Dhakal, Bhaba Krishna Bhattarai, Purushottam Ghimire, and Bishnu Prashad Nepal, as well as to the programme directors and planning officers of the Secretariat. Programme Director Manahari Khadka, and Planning Officer Nita Aryal deserve special mention for their involvement in the study from its inception.

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Mr. Gopi Nath Manila
Joint Secretary
National Planning Commission Secretariat

SUMMARY

In June 2013 a study was carried out in five districts vulnerable to floods, drought, or landslides to collect first-hand information about specific environmental stresses and their impact on the displacement of local people. Mahottari District was selected for its problems with flooding; Udayapur District for landslides; and Panchthar and Kavre districts selected for drought stress. Gulmi District was selected because the flow of emigrants has remained high since historical times.

The findings reveal that environmental stress often displaces people who depended on ecosystem services for their livelihoods. The following are some of the highlights.

1. Over the last 10 years, water sources in Panchthar and Kavre have gradually dried up, over the last ten years and springs in Gulmi have been drying up rapidly in the same period. The government has declared 11 villages in Kavre drought-affected.
2. Water markets have flourished in areas where local water sources have become dry. In Yashok, Panchthar, for example, people pay NPR 1.5 per litre for water tractors bring from faraway sources.
3. Forest cover in Yashok, Panchthar, increased over the last 10 years. Farmers claim that longer periods of the drought have forced them to leave arable land fallow, thus enable trees to grow. Some abandoned agricultural land is now forested.
4. In Mahottarai, because of the declining groundwater table, there is less water in wells and people, mostly women, have to wait in queues to collect water.
5. Farmers reported sharp declines in the production of rice, maize, millet, wheat, mustard, peanuts, buckwheat, broom grass, ginger, lemons, and oranges.

People in Yashok, Panchthar District, and Dauwa, Gulmi District, have stopped planting rice because conditions are too dry.

6. Practicing animal husbandry has become difficult, and the production of milk and meat has declined in drought-hit areas.
7. People from Panchthar and Gulmi have coped with water shortages by moving to Terai districts. In Kavre, people with homes in the highlands have moved to lower elevations where more water is available. Those from Panchthar do not expect to return; they often find opportunities to work on a contract basis in the paddy fields of Jhapa and Morang and are content to remain. In fact, some migrant families from Yashok have certificates enabling them to live permanently in Jhapa and Morang. Migrants from Gulmi and Kavre, in contrast, hope to return once the water situation improves. Displaced families from Kavre do not have migration certificates because their migration (to lower-lying land in the same VDC) is largely temporary in nature.
8. Displacement due to the floods and landslides in Mahottara and Udaypur districts is permanent because the land where migrants once lived has generally turned into wasteland.
9. More Chhetri and Brahman families migrate than do adivasi (indigenous) and janjati (ethnic group) families.
10. Historically, people from Panchthar, and Gulmi migrated to the Terai in search for better opportunities. But this trend seems to be changing. In the 1990s, it was the armed conflict that drove people to move and now it is drought. The historical trend of migration among the people of Kavre is within the district, from high to lowland.
11. Though Udayapur and Mohattari once attracted migrants from the hilly areas today they themselves are growing increasingly vulnerable due to landslides and floods respectively.



Introduction

1.1 Background

Over the last four decades, during which that the environmental movement in Nepal has actively emphasised protecting the environment, many positive developments have occurred. The protection and development of forests by communities is such a robust programme that it has become an internationally lauded model of natural resource management. Nepal also made good strides in reducing the poverty rate, which dropped from 42% to 23.8% over the last decade. Despite these achievements, grinding poverty and environmental degradation persist, as they have for decades, as issues of grave concern.

For the last two decades, Nepal has experienced, political, economic and environmental changes of a nature and at a pace never seen before. Over ten years of insurgency has advanced the country on a complex course of social restructuring. The majority of youth aspire to foreign employment, an aspiration which began largely as an escape from high rates of unemployment and poverty but later served as a safety vent when security concerns escalated during the insurgency. A dearth of employment and economic opportunities continues to force Nepali youth to seek foreign employment, a trend which will have consequences far into the future. Already over two million people are officially working abroad and many more are undocumented migrant workers.

Besides the security and economic push factors driving the choice to migrate, environmental factors have also displaced people forcefully¹. In a biomass-based economy like Nepal's, where 85% of energy needs are met by fuel wood, dung, and agricultural residues, declining productivity, floods, landslides, drought are often at the core of the economic problems. Floods and landslides have long been recognised as reasons for displacement and drought is emerging as a similarly serious problem.

This study examines the reasons in five selected districts, which forces people make the hard decision of moving to a new place of residence in order to escape severe environmental problems.

¹ Displacement has been used as forced migration of families either within or outside the district while volunteer migration has been considered in this report as migration.

1.2 Migration situation

For scores of years and still today migration has an important livelihood strategy for the populations of resource-poor villages across Nepal. In the 19th century, Nepalese youth were recruited as Gurkha² soldiers to serve in the British Army during the British Raj. Later, migrants sought menial work in factories and as housekeepers in various Indian cities or did wage agricultural labour in fertile areas like Punjab. According to Upadhya (2009), the government recognised as early as 1958 that Nepali youths hunting for jobs were being forced to migrate to other countries for jobs. The nation's first National Agriculture Conference, which was held in 1958 in Kathmandu, stated that one of the major concerns of development then was to find solutions to the degradation of natural resource and identified floods and landslides as a major reason for youth migration. While India was the traditional destination, today it is only the poorest who stay so close to home. Other popular destination countries include Malaysia, Lebanon, the Republic of Korea, the UAE, Qatar, and other Gulf countries (GoN, 2012). There are no accurate statistics on how many Nepalis currently work outside the country, but that number is estimate at not less than three million. Of them, around 40 percent go to India alone; ten percent of them are women. Of the 60% who go further afield, 9% are women (Nepal Institute of Development Studies, 2009; Nepal Institute of Development Studies, TARU and Refugee and Migratory Movements Research Unit, 2011). In about half of all families, one or two members go abroad for employment. Most send regular remittances and return home every few years, carrying goods and cash.

Another type of migration is that of an entire family. The abject poverty of hill dwellers has long been a priority of the state, and solutions were sought whenever opportunities arose. One major step in poverty alleviation was taken when the dense forests of the Terai were cleared and opened for settlements in the early 1960s after malaria was eradicated in the mid-1950s. A large number of people moved, many of them well-off families with sufficient land but also many others victimised by poverty, food shortages, or floods and landslides. Unlike individual migration for labour, families those which moved to the Terai left their villages in the hills permanently.

Table 1.1: Overview of migration facts

SN	Information	Number
1	Number of people working as migrant laborers abroad (as of April 2013)	2,465,699
2	Population found absent in 2011 census	1,921,494
3	People who went abroad for employment in fiscal year 2012/13	384,665
4	Number of people working in India (estimated)	4 million
5	Number of people displaced (estimated) due to decade-long armed conflict (1996-2006)	200,000 - 300,000
6	Number of people displaced due to recurrent flooding in 2007	70,000
7	Internally displaced due to flooding caused by Kosi embankment breach alone in 2008	180,000

Source: DOEF, 2013; CBS, 2012; Khatiwada, 2011.

2 The Anglicisation of the Nepali district of Gorkha, where many of the recruits were from.

1.3 Environmental problems

Environmental problems are generally associated with the degradation of land, water, and forest resources. The challenge is to understand to what extent such degradation has been responsible for the displacement of people who depend on those resources. Throughout history people have developed ways of managing resources so that they maintain their potential to support economic activities. When the level of degradation exceeds a certain threshold level, however, those who depend on them are left with no option but to look for alternate sources of income in addition. One solution is to migrate for a few months or years and send remittances to those back home, but in other cases, a one-time disaster, particularly a big flood, or chronic degradation is so severe, the entire family has no choice but to migrate. Big floods usually displace people forever.

Weather-related disasters have increased the number of displacements worldwide. According to the Internal Displacement Monitoring Centre (IDMC, 2011), such disasters accounted for 92 percent of the total number of persons displaced globally. Changing rainfall patterns and rising temperatures, combined with rapid population growth, suggest that more and more people are likely to be affected as time passes (IDMC, 2011).

1.4 Disaster scenario

Because of a wide variety of physiographic, geological, ecological and meteorological factors, Nepal is prone to various types of natural and human-induced hazards, including floods, earthquakes, droughts, landslides, hailstorms, disease epidemics, glacial lake outburst floods,



Farmland damaged by recurrent floods - Udayapur

and fires. Rapid population growth, improper land use, slow economic development, and the civil conflict have increased the population's vulnerability to such disaster hazards (United Nations Development Programme, 2004). In fact, floods and landslides causes significant losses of lives and property across the country every single year (Ministry of Agriculture and Cooperatives & United Nations Development Programme, 2004).

Though the exact number varies from year to year, families are commonly displaced by floods and landslides. Some are forced to move only after years of recurrent erosion of the riverbank land they depend on for food production. Rivers in valleys and plains often cut banks a few meters every year until so much is lost, families become landless. This sort of displacement is very common in the Terai region. Landslides and slope erosion are another common cause of displacement. If steps are not taken to conserve it, cropland in the hills and mountains grows increasingly unproductive as topsoil is eroded and slopes fail. Most landslides occur in and around cropland. When a household can no longer produce enough food for even few months, it is forced to consider having one member migrate for work or, because employment opportunities are few, especially in villages, moving out altogether.

Besides landslides and floods, water scarcity has also forced people in different parts of the country to abandon their longtime homes. In fact, reports of such incidences have risen in recent years. In the hills, springs feeding the local water sources are drying up while in the Terai, groundwater is depleting. Shortages of water have negatively impacted both farming and animal husbandry.

Against this backdrop, this study attempts to understand the linkages between displaced people and the environmental problems they faced before displacement.

1.5 Objectives of the study

The main objectives of this study are as follows.

- » Collect first-hand information about the environment-related displacement of local people from selected areas representing different agro-ecological zones.
- » Analyse the cases to establish, wherever applicable, the environmental causes of displacement.





Conceptual frame and methodology

2.1 Conceptual frame

The study was conducted in areas that were identified as having one of the following environmental problems:

- » Floods (annual phenomenon with increasing impact)
- » Landslides (induced by monsoon rain)
- » Drought (occasional but becoming more frequent and widespread)

To ensure that the case studies would be representative, the study used the vulnerability assessment of National Adaptation Programme of Action (NAPA, 2010). The susceptibility of each district to four environmental stresses--floods, landslides, glacial lake outburst floods (an important parameters for climate change impact), and drought--was ranked as very high, high, and moderately high (Table 2.1) .

Table 2.1: Ranks of districts on the basis of NAPA’s Vulnerability Index

Environmental stress	Vulnerability index	No. of Districts	Districts
Flood	Very high	1	Mahottari
	High	8	Rautahat, Chitwan, Parsa, Saptari, Siraha, Sunsari, Dhanusha and Bara
	Moderate	7	Sarlahi, Nawalparasi, Kailali, Jhapa, Morang, Kanchanpur and Bardiya
Landslide	Very high	4	Udayapur, Kathmandu, Mugu and Lamjung
	High	25	Darchula, Baglung, Rolpa, Achham, Makwanpur, Dolpa, Parbat, Taplejung, Ramechhap, Gorkha, Salyan, Doti, Bajhang, Sindhuli, Bhaktapur, Solukhumbu, Baitadi, Kaski, Rasuwa, Sindhupalchok, Jajarkot, Rukum, Nuwakot, Dhading and Myagdi
	Moderate	19	Bajura, Bhojpur, Okhaldhunga, Sankhuwasabha, Syangja, Dailekh, Arghakhanchi, Tanahu, Kalikot, Kavre, Dolakha, Khotang, Dang, Surkhet, Humla, Gulmi, Jumla, Panchthar and Pyuthan

Environmental stress	Vulnerability index	No. of Districts	Districts
Glacial lake outburst flood	Very high	6	Dolakha, Solukhumbu, Manang, Mustang, Taplejung and Gorkha
	High	6	Khotang, Sankhuwasabha, Lamjung, Okhaldhunga, Ramechhap and Dhading
	Moderate	7	Bhojpur, Panchthar, Udayapur, Tanahu, Tehrathum, Sindhuli and Dhankuta
Drought	Very high	7	Jajarkot, Mugu, Kalikot, Dailekh, Saptari, Achham and Siraha
	High	15	Dolpa, Humla, Kathmandu, Jumla, Dadeldhura, Bajura, Bajhang, Rukum, Salyan, Dolakha, Rolpa, Ramechhap, Doti, Dhanusha and Dhading
	Moderate	18	Baitadi, Sarlahi, Bardiya, Pyuthan, Rasuwa, Manang, Kanchanpur, Mustang, Bhaktapur, Gorkha, Mahottari, Udayapur, Kapilvastu, Darchula, Rautahat, Bhojpur, Solukhumbu and Arghakhanchi

Source: NAPA, 2010.

Of late, many district have turned out to be more vulnerable than indicated by the NAPA. For example, the districts of Panchthar and Kavre, neither of which was listed as vulnerable, have faced severe water scarcity in the last few years and, as newspaper reporting suggests, the problem is worsening. The government has declared other areas as “severely drought-hit.” All of this input was used to select the study site.

2.2 Methodology

Site selection

The five districts of Panchthar, Kavre, Gulmi, Udayapur, and Mahottari, were selected based on the NAPA Vulnerability Index and other information, including government declarations and newspaper reports of people displaced by one or more of the three key environmental stresses—floods, landslides, and droughts.

Table 2.2: Dominant environmental problems in the selected districts

District	Dominant problem	Information source	NAPA vulnerability ranking
Panchthar	Drought	Newspaper reports	Not categorized
Kavre	Drought	Government declaration	Not categorized
Gulmi	Drought	District sources	Not categorized
Udayapur	Landslides/floods	NAPA	Very high
Mahottari	Floods	NAPA	Very high

The challenge was to select specific study areas within the districts. Panchkhal, Kavre, was selected because the government designated it severely-drought-hit and Yashok, Panchthar, was selected because newspapers reported that people had abandoned their villages due to



Limited supply of water has to be shared among families in the village - Gulmi

acute water scarcity in the winter. The study team contacted district administration offices, district development committees, the district-level Red Cross chapter, land reform offices, and others for assistance in selecting appropriate study areas in Udayapur, Mahottari, and Gulmi.

Table 2.3: Selected VDCs and municipalities

District	VDC/Municipality	Major problems	Cross-cutting issues
Panchthar	Yashok, Ranigaon, Syabarumba (Yashok Region)	<ul style="list-style-type: none"> • Drought • Depleting water sources 	<ul style="list-style-type: none"> • Forest • Grass/grazing land • Biodiversity • Displacement • Voluntary migration
Kavre	Panchkhal, Sathighar Bhagwatisthan	<ul style="list-style-type: none"> • Drought • Crisis of water 	
Gulmi	Dauwa, Baletaksar, Bamgha, Digam, Handineta, Jaishithok, Thanapati, Biruwas	<ul style="list-style-type: none"> • Depleting water sources • High rates of emigration 	
Udayapur	Saune, Khabu	<ul style="list-style-type: none"> • Landslides • Soil erosion • Land degradation 	
	Hardiya, Jogidaha, Sundarpur	<ul style="list-style-type: none"> • Floods 	
Mahottari	Kishannagar, Gonarpur, Kaluwa, Bagaiya, Bhataliya, Jaleswor Municipality	<ul style="list-style-type: none"> • Floods 	

Gulmi District has been known for water shortages for a long time but its situation has deteriorated and it now suffers from increasingly long dry spells. The South, in particular, has been dry for a long time and its dryness has been compounded by the fact that the past few successive years have seen less precipitation than normal.

2.3 Fieldwork

Three experienced field researchers visited each of the selected study areas and consulted stakeholders there as well as key informants at the district level. This field study helped generate case studies based on the observations of the field researchers as well as the responses of senior citizens and other key informants. The field researchers also consulted central authorities with regards to internal migration in recent years.

A checklist with questions relating to the issues was used during the consultations. It was designed to aid in the collection of information about how and to what degree environmental causes serve as push factor for displacement as well as to examine how best to isolate environmental causes from other stresses such as a poor economy or lack of security, which are often considered more directly responsible for displacement.

2.4 Data analysis

Responses to the questions in the checklist were compiled into a matrix that shed light on the major environmental issues currently facing local people, of the difference between today's situation and that of 10 years ago, the probable causes of these problem, and how people coped with these problems before deciding to migrate. The information thus tabulated was analyzed to identify those environmental problems associated with key natural resources and associated ecosystem services that have been responsible for people's deciding to migrate, for however long, or to move away permanently. The findings were compiled into this report.



One of the many drying wells - Kavre



Findings

3.1 The changing resource base

The forests of the Yashok region, particularly in areas such as Ranigaon and Syabarumba, have been experiencing a change in species composition over the past 10 years. Previously established trees such as oak, rhododendron, and walnut have begun to die out, and pine, bamboo, and Nepalese alder trees to increase. The following reasons have been considered responsible for this change in composition:

- » Cropland remained barren for several years due to a prolonged drought and pine trees began to grow on barren terraces.
- » Cropland abandoned by migrants has turned into forest. Also as a result of migration, with no livestock to graze on them, old paddy fields have turned into shrub land.
- » Animal husbandry has sharply decreased due to the shortage of water. People do not keep as many cattle as they did a decade ago.
- » Forest cover has increased because of increased awareness among people that forests must be conserved.

Until 10 years ago, Roteping Pakho was a huge area of grazing land. Grazing land at Khalde of Yashok VDC and Jyamire of Syabarumba VDC still exists but drought has reduced the extent and density of grass cover. The shortage of water has led to the abandonment of cattle farming, allowing former grazing lands to turn into jungle.

In Udayapur District, landslides and erosion are seen as major environmental problems affecting farmers. Until about three decades ago, the area studied in Udayapur was covered by dense forest; that same forest is now degraded and thin. Deforestation was caused largely by two decades of over-harvesting, theft, and land development for flood victims. The cultivation of newly cleared area led to numerous landslides and widespread soil erosion. The problem has been accentuated by the drying of water resources and irregular rainfall of recent years.

There was enough grassland and grazing land in the study area till 1980s, but the increasing number of landslides has made it very difficult to even locate the areas where grassland once existed. Grassland has been swept away by floods, damaged by landslides or encroached on by people keen to extend cultivation. Today farmers can only use forests for grazing during the four monsoon months (June to September), whereas in the past, year-round grazing was possible. The lack of fodder has decreased the average number of animals a household keeps.

In Mahottari District, the study area was once covered with dense forest. In the past, the temple of Lord Shiva now located in Jaleswor Municipality was in the middle of the forest. Dense forest was found in the middle of the Hattilet and Bardibash VDCs until 2003, when it was cleared for agricultural purposes. Very few and very small patches of forests remain. Recurrent floods are now a major problem.

As was the case in Udayapur, in Mahottari too, some areas were grassland and some of those were used for grazing. Animal husbandry was a major occupation of people in the study VDCs as long as an adequate amount of fodder was available. Now the grassland has disappeared and fewer animals are kept. Land has become unproductive because of the increasing amount of siltation caused by recurrent floods.

The case is different in the district of Gulmi. Its forests, mainly in those in Dauwa VDC, were cleared during the armed conflict period between 1996 and 2005. Since the loss of the forest the area has become even drier than it once was. People have attempted to replant and reestablish greenery but have not been successful due to shortage of water. The grazing of Jerithumka has been decreased significantly.

3.2 Increasingly stressful livelihoods

As is the case in many areas of Nepal, agriculture is the main source of livelihood in Panchthar. Farmers grow paddy, maize, millet, wheat, mustard, peanuts, and buckwheat. They also grow broom grass, ginger, lemon, and oranges for cash income. However, the production of these cereals and cash crops has been declining gradually due to increasing drought in the last few years. In Yashok region, the early paddy planting, which they call winter paddy, and used to be usual crop until 2000, has been completely stopped due to shortage of water.

Lemon farming used to be a major source of income in the Yashok region. Farmers used to hire porters so they could export substantial amounts of lemon to Dharan and Damak. Now lemon farming has almost stopped. Orange orchards still exist but harvests are decreasing slowly and the trees have been attacked by massive infestations of insects.

In Yashok region, water scarcity is spreading geographically and slowly undermining the livelihoods of many farmers and forcing them to seek alternatives, oftentimes jobs in urban centers across the border in India. In the past people migrated to Darjeeling, Sikkim and Bhutan to work as porters. Today they go to Malaysia and the Gulf countries. Local economy is supported by remittances. According to local people, Yashok region receives more than NPR 40 million a month.

Sources of water in Yashok are drying up rapidly. The drying of springs began in the low-lying areas of Khalde, Tallo Bhulke, Hati Pokhari, and Hauntha and has gradually climbed to higher elevations. Local people believe that springs in Phakdep, Chilingden, and Pouwa Sartap, villages located high up in the hills, will also dry and that drought conditions might spread to the adjoining district of Ilam.

Since water shortages during the periods of plantation and growing have resulted in declines in food production within the Yashok region, most food is imported from Tarai districts using the money that migrant remit. Where there are roads, it is transported in small trucks and jeeps; where there are not, human porters carry it.

Three hours to walk for one pot of water

Lila Chauhan, 27, of Syabarumba-9 in Panchthar District, walks for three hours every day to fetch a single pot of water. At the water source, a well (kuwa), she has to wait for hours for her turn because there are so many others queued up. According to Lila, three other families have left Syabarumba due to water shortages. The water scarcity grew severe about five years ago, when community taps still delivered water to houses. Now it has become extremely difficult to get water.



Lila Chauhan on her way to the water source - Panchthar

The district of Gulmi is a water-deficit area. Most springs are found at low elevations, and people who live at hilltops must collect water daily. They also use indigenous techniques, primarily manmade ponds to capture and store rainwater, in order to make water available locally. This water is used for various domestic uses but seldom to irrigate kitchen gardens. It is simply too precious. Thus, most farming is rain-fed. Unlike in other areas in the hills, people in Gulmi fence their pond to keep them free of contamination and other disturbances.

Despite these fences, it is difficult to keep pond water clean given the large numbers who use it. To address this problem and keep water clean and regulate its collection, the people of Gulmi employ a unique system of artificial wells. A 1 m deep and 1--1.5 m wide pit is dug in a safe, secluded place right next to a pond so that the rainwater collected in the pond will gradually seep into it. This pit acts like a natural well. The water which seeps through to the well is collected in small quantities for domestic uses, including feeding animals. Because of a fortuitous rainfall in the night, the study team was able to observe the collection of rainwater and the happiness of the locals, who had been waiting for a long time. For them, more water in the pond meant that they would have water in their well for more days.



Artificial well (marked with a circle) built next to a rain water collecting pond to collect water for domestic use - Gulmi



One of the abandoned houses of Yashok in Panchthar

3.3 Drought-induced displacement

Most emigrant families from the hill districts of Panchthar and Gulmi, moved after the water shortage became severe. Villagers from Yashok region migrate to Jhapa, Morang and Sunsari districts in the Terai, while those from Gulmi go to Butwal Municipality, Rupandehi District, or, in fewer numbers, to Pokhara Municipality, Kaski District, and the neighboring districts of Kapilvastu, Nawalparasi, and Dang.

Those who migrate have not sold their properties in their places of origin. There are no buyers, not for land nor houses nor cattle nor household utensils. Some of the abandoned houses were in a dilapidated state. Since there is no market for land, migrants simply lock the door and leave their property with no caretaker.

The major distinction between migrants from Kavre and Gulmi and those from Panchthar is that the latter do not expect that they will ever return but the former expect to go home when the water situation improves and they are hopeful that it will. Migrants from Panchthar are employed in the paddy fields of Jhapa and Morang on a contractual basis, they have no desire to return.

3.4 The ethnic dimension of displacement

In the areas studied in the districts of Panchthar, Kavre and Gulmi, more Chhetris and Brahmans than adivasi and janjati migrated. Adivasi and janjati migrants were mostly voluntary migrants; they were retired army personnel and people who already owned land and a house in the Terai.

3.5 Trend in population growth

A comparison of the two censuses of 2001 and 2011 (Table 3.1) provides insight into the changing trend in population in each study area. The populations of Udayapur and Mahottari districts increased, while those in Kavre, Panchthar, and Gulmi decreased, by a substantial number in the latter two districts (0.51% and 0.56% respectively).

Table 3.1: Trend in population growth in the study districts

SN	District	Population		Change in 10 years	Annual rate of change
		2011	2001	No.	%
1	Panchthar	191,817	202,056	-10,239	- 0.51
2	Udayapur	317,532	287,689	+29,843	+1.04
3	Mahottari	627,580	553,481	+74,099	+1.34
4	Kavre	381,937	385,672	-3,735	-0.10
5	Gulmi	280,160	296,654	-16,494	-0.56

Sources: Central Bureau of Statistics, 2003; Central Bureau of Statistics, 2012.

Of course there are many reasons including economic opportunities for people to move from one area to another, the environmental stresses also need to be taken into account while analyzing reasons for displacement. This is particularly important in the context of climate change which is likely to exasperate extreme events of floods and droughts.

According to the census figures for absentee households, more than half of the households (54.1%) in Gulmi reported having at least one member absent during the 10-year period between 2001 and 2011. Of the total population, however, one-fifth (20.9%) were absent in Gulmi, the highest proportion of all 75 of Nepal's districts. Panchthar reported 34.1% of households were absentee households and Mahottari, 28.3% (Table 3.2).

Table 3.2: Information on absent populations in study districts

SN	District	Total hhs. (no.)	Absent hhs. (no.)	%	Total pop'n. (no.)	Absent pop'n. (no.)			% of total pop'n.
						Male	Female	Total	
1	Panchthar	41,176	14,041	34.1	191,817	16,605	1,237	17,842	9.3
2	Udayapur	66,514	17,758	26.7	317,532	20,036	2,024	22,060	6.9
3	Mahottari	111,298	31,500	28.3	627,580	39,621	911	40,541*	6.5
4	Kavre	80,651	11,782	14.6	381,937	12,565	1,966	14,531	3.8
5	Gulmi	64,887	35,131	54.1	280,160	51,222	7,339	58,561	20.9

* The sex of nine absentees is not stated.

Source: Central Bureau of Statistics, 2012.

VDC-level populations at VDC level has also been found decreased but the number of households have increased. The total population of Yashok region in 2001 was 24,395 which decreased to 21,819, while the number of households increased from 4518 to 4,659 in ten years between 2001 and 2011 (Table 3.3). It shows how property sharing system in Nepal is a reason for land fragmentation. Such fragmentations usually weaken local capacity to adapt to environmental stresses.

Table 3.3 : Trend in population growth in the Yashok region

SN	VDC/Region	Households (no.)		Total population (no.)	
		2011	2001	2011	2001
1.	Aangsarang	1,159	1,138	5,701	6,145
2.	Mangjabung	771	738	3,692	3,987
3.	Ranigaon	1,068	1,022	4,985	5,517
4.	Syabrumba	714	685	3,217	3,700
5.	Yashok	947	934	4,224	5,046
6.	Total	4,659	4,518	21,819	24,395

Sources: Central Bureau of Statistics, 2012.

This case study has identified a number of households being displaced due to drought, landslides and floods. Some of the households from Yashok region have obtained migration certificate for permanent migration to Jhapa and Morang. Displaced families from Udayapur, Mahottari and Kavre do not take migration certificate because their displacement is rather temporary in nature and to nearby low land areas of the same VDC.

Table 3.4: Number of households displaced

District	VDC/ Municipality	Displaced households (no.)	Reference period	Destination
Panchthar	Yashok,	20	In May 2013	Jhapa, Morang, Sunsari. About 50 families have migration certificates.
	Ranigaon,	16	April-June 2013	
	Syabarumba	200	Since 2001	
Udayapur	Saune	10	7 hrs. after 2001; 3 before	Nearby places
	Khabu	1	2-3 years ago (due to road construction)	Moved to a nearby house to work as road labourers
	Hardiya	200	Some before 2000; some during 2004 floods; many after flood of 2008	They have settled on the bank of the river, but move back when the plain gets flooded.
	Jogidaha	100		
	Sundarpur	200		
Mahottari	Kishannagar	10	Some houses before 2000; some houses during 2004 floods; many of them after flood of 2008.	Settled on riverbank but move back when the plain gets flooded.
	Gonarpur	150		
	Kaluwa	100		
	Bagaiya	150	The 2008 flood affected 44 VDCs.	
	Bhataliya	100		
	Jaleswor Municipality	100		
Kavre	Panchkhal	4	April-June 2013	To the valleys of the respective VDCs
	Sathighar Bhagawatisthan	78	Since 2001	
Gulmi	Dauwa	40	After 2008	Baletaksar Butwal Palpa
	Baletaksar	4	Within the last 2-3 years	
	Jaisithok	4	April-June 2013	
	Rimuwa and Bamgha	133	In last 2-3 years	

3.6 Area-specific displacement

Panchthar

Over the last few years, Yashok region in Panchthar has increasingly suffered from water scarcity. The shortage is particularly acute in Khalde-1 and Lumdekha-9 villages of Yashok VDC respectively but the villages of Hati Pokhari-3, Sepini-2, Simra-5, Ranigaon-6, and Tingden/Thungseling-8 are also short.

Currently, about 850 households have moved, more than 20 of which left as recently as February and March 2013. Another 16 households, six Dalit and 10 Brahmin, were displaced from Yashok VDC. Families from the village of Punwa-7 have also emigrated.

Water shortages in the village of Syabarumba village forced more than 200 households to leave the area. Informants claimed that the rate of emigration was three or four families every week. Those which plan to move permanently get a migration certificate; forty families have done so in the last year alone. Most of these families plan to settle in the Terai districts of Morang and Jhapa.

Til Bahadur borrowed money to migrate

When the study team first encountered Til Bahadur Bohara, 30, of Syabarumba VDC-2, Panchthar, he, his wife, his son (seen in the picture below) and his parents were travelling to Jhapa by a jeep he hired. Til Bahadur has about 3 ha of land in Syabarumba, which, by any standard, is a large piece of land in the hills. Enough land, in fact, to make him qualify as a well-to-do person. However, with increasing water problem he abandoned it for an insecure future. Because of the move, he had a debt of NPR 500,000, to be paid back at an annual interest rate of 24%. But he had bought 9 kattha of land in Chakchaki VDC, Jhapa, where he planned to start over again. His story tells for itself the misery brought about by the water crisis in the region.



Kavre

In Kavre, four families of wards nos. 2 and 4 of Katike Deurali VDC have moved to wards nos. 3 and 5 of the same VDC because water is more available.

Sathighar VDC, which is located on area ridge, has also suffered from a water shortage. Since 2003, 10 families from Ward No. 9 have moved to lowland in Ward No. 3, as have nine families from Ward No. 2 and nine families from nearby Baluwa VDC. Fifty families of the Bhetwal community from Ward No. 3 moved closer to water sources in the same ward. Altogether 78 families from Sathighar VDC have moved. Unlike the families of other districts, those in drought-hit areas in Kavre have moved to nearby places and not out of the area.

Gulmi

Forty families from Dauwa VDC in Gulmi District have moved out from the village since 2008. Among them, 31 families moved because of water shortages; nine moved for other reasons. Altogether 429 individuals from 128 families, largely originating from Ward No. 7 of Baletaxar VDC, have moved out since 2003 with migration certificates. Water shortage was one of the reasons they left. Thirty-one Dalit families from Baletaxar, Bamgha, and Rimuwa VDCs were granted migration certificates.



4

When is it that people decide to move?

The study attempted to find out when it is that people make the hard decision of migrating because the water shortage is so severe to bear. Below are some observations.

- » When springs go dry, it is difficult to get water even the relatively small amounts needed for domestic purposes. It is generally the women of a family who manage water for domestic uses. Besides the fact that this division of labour is traditional, few male members are left in villages to help carry water as most of them have gone abroad to work. Fetching water has become a major household chore.
- » The shortage of water has made it difficult to maintain good health and hygiene practices. One local in Ward No. 3 of Yashok said that he had not taken a head-to-toe bath in 10 years (*mayal phyakera nanuwayeko dashakau bhayo*).



A Jeep loaded with family possessions ready to depart from the village - Panchthar

- » The government's campaign to halt open defecation has been severely affected. There is no use constructing toilets as there is no water to clean them. People prefer to defecate in the open.
- » Taking a bath and washing one's clothes in a must when a family members dies. Villagers in Ranigaon and Yashok villages are finding it increasingly difficult to do such ritual washing.
- » The water problem has forced villagers to cull most of their livestock, but while they no longer need to worry about getting water for their livestock, they are deprived of milk and meat to eat as well as compost for their farms.
- » The few buffaloes that they have kept are often sick. Hair loss is one result of the lack of adequate water. Milking animals produce milk for about six months after they give birth instead of for a year or more as they did until a decade ago.
- » In Kavre, farmers have changed their source of income from dairy products to vegetables due to water problems. Vegetables need to be irrigated just once every fortnight while animals need water every day.
- » Some students, especially girls, cannot go to school as they have to queue for hours to fetch a single pot of water. The number of students is decreasing.
- » Water shortages have affected social life. Parents find it problematic to get their sons married because girls refuse to get married into areas which experience a perpetual scarcity of water. As a result, young men prefer to migrate to a city or abroad instead of living in a village.
- » To fetch water, 43 households in the village of Jeripokhara-9 of Dauwa VDC, Gulmi District walk 1.5 hours to a distant water source and spend many hours in a queue, waiting their turn.
- » Women feel insecure when they have to queue for water till midnight at sources of a distance of more than one hour.
- » When people gather to celebrate local feasts and festivals they often get sick as they are compelled to use contaminated water to cope with the extra demand.
- » The changing water scenario has resulted in the need to import both food and water. Emigrating to an area which has both food and water in ample supply is one way to escape from this inefficiency.



Local responses to environmental stresses

5.1 Responses to drought

- » In 2012, the village of Khalde in Yashok bought a water source located in the village of Aambote/Simalchaur village for NPR 130,000. About 200 households rely on it, but since its flow is decreasing, it is very difficult to say how long it will be able to supply sufficient water supply. Had they not bought this source, more than 100 families would have already faced acute water shortage.
- » The residents of Ranigaon village buy water from the Tamor, Shiva and Nibhu rivers located 4-7 km away. Water transported by tractor from the river costs them NPR 1.50 per liter.
- » The villagers of Syabarumba VDC are comparatively fortunate because some water sources (kuwa) still exist there. The water sources of Ward No. 6 of that VDC, however, began to dry up in 2002 and have yielded no water at all since 2011. Around 150 families of Aahale-7 collect water from Andheri Khola, a stream located more than 3 km away. The most severe shortages of water in this VDC are experienced in ward nos. 6, 7 and 8.
- » In Kavre, villagers argue that pumping water from the Sunkoshi River to the villages of Katike Deurali would benefit villagers but would require a large project.
- » Locals use bulldozers to dig pits in nearby streams beds during the dry winter season in order to make water available for irrigation in Panchkhal.
- » The water supply project built in Devitar VDC in 1975 was initially sufficient but it has not been able to keep up with the demand as migrants have swelled the population.
- » Water for Sathighar VDC is pumped 2 km from Dhandre and Tinghare Batodaha streams. Electric pumps have been set up every 500 m and tanks installed. On the top of the hill, water is stored in two tanks with capacities of 50,000 L and 20,000 L and distributed to the villagers. However, the pumps are growing increasingly less effective and the electricity tariff has reached more than NPR 3.5 million.
- » Dauwa VDC, which is 26 km from Tamghas, the district headquarters, has



Rainwater collecting tanks rendered redundant in absence of adequate rain – Gulmi.



suffered from a shortage of water for a long time. Every house has a 15,000 L vessel in which to collect rooftop rainwater.

5.2 Areas to be explored further

- » Why is it that sources of water are drying up even in areas that have adequate forest cover?
- » Why is the scarcity of water shifting from low to high elevations in the Middle Hills of eastern Nepal ?
- » What does the correlation between dry areas and greater numbers of bamboo and pine trees in dry areas mean? If these species are aggravating water scarcity, is it time to review promoting green under environmental programme?
- » What is the reason that water resources began drying up in about the year 2000? Is there any significance to that year?
- » Is there any connection between recently built networks of access roads and the increasing water scarcity in the hills?



Conclusion

The degradation of natural resources undermines the ability of ecosystems to support food production and, over time, to sustain the livelihoods of local communities. Food shortages or lack of opportunities to earn cash have historically forced Nepalese people to look for employment outside the nation. The recruitment of Nepalese youth by the British and Indian armies and the migration of Nepali youths to various places in India and, more recently, other regions of the world, to work as menial labourers are the results of the inability of local ecosystem-based economies to generate enough income to meet the basic needs of the family. A proportion of rural Nepal has always been dependent on non-farm income but today that proportion is growing.

Besides those who migrate to earn income, some migrants were forced to move from hills to the Terai when they lost the cultivated land they depended on to landslides or flash floods. Historically, a great number of people moved to the Terai in the 1960s when forests were cleared.

In subsequent years, the government adopted policies to protect and improve the natural environment in the hills and mountains which focused on forest development, watershed management, and the establishment of parks and reserves. Even today, however, people continue to be displaced by landslides, floods and land degradation in the hills and by sand casting and riverbank cutting in the Terai. In addition, a new category of stress is being felt increasingly strongly—drought and water scarcity. Water scarcity has rapidly increased in severity and prevalence in recent years. In fact, in some mountain areas it is so severe, villagers have abandoned their homes moved to places where water is available.

The nature of the environmental problems Nepalis confront vary from place to place and from region to region. They also differ among communities within a given area, depending upon their dependency on ecosystem services. Regardless of the exact problem, the impacts of land degradation, landslides, floods and water scarcity have increased internal migration sharply in recent years.

The study found that water scarcity, in particular, is a pressing concern. It has had wide-reaching economic and environmental effects, threatening agriculture-based livelihoods threatened and undermining natural resource bases. Fruit production has declined especially sharply, but the production of vegetables and pulses has also decreased. Water shortages have also impacted sanitation and hygiene behavior as the lack of water renders it impossible to use toilets as they cannot be used. Marriage patterns have changed as young women refuse to marry into villages which lack water. People have exploited all options to sustain their livelihoods, from digging

pits in dry river beds to pumping water. In some places farmers have turned their paddy fields into maize and millet fields, as these crops require less water. When none of these efforts work and life becomes miserable, people pick up and move, either temporarily or for good.

The study shows that a significant number of people are still displaced by environmental causes despite successes in protecting environmental resources. Drought has become a new challenge that people find extremely difficult to deal with. The seriousness of the matter is further compounded by the fact that water scarcity have started to appear even in the middle of the monsoon, indicating an extremely dry winter in the waiting. Our water supply projects still use conventional methods of bringing water from faraway sources to water scarce areas or digging deep to tap groundwater sources, both of which may not be feasible in study areas because springs have also dried far and wide. The assumption that there is plenty of water in the groundwater aquifer in drought affected areas needs serious review. Before it is too late, steps must be taken to (i) understand the emerging changes in local hydrological cycle, (ii) develop methods of making water available, and (iii) increasing water use efficiency in agriculture and domestic uses.



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Annex

List of persons contacted during the study

SN	Name	Address	Age	Occupation/ Designation	Affiliation
1	Madan Kumar Bohra	Syabrumba-5	53	Teaching (headmaster)	Mahendradwaya Secondary School Syabrumba-5
2	Tatha Bahadur Ghimire	Yasok-1	63	Politics (area chairperson)	Rastriya Prajatantra Party Nepal
3	Keshab Chandra Bhandari	Syabrumba-3	54	Politics (area secretary)	Rastriya Prajatantra Party Nepal
4	Tej Bahadur Chauhan	Syabrumba-3	56	Chairperson	School Management Committee, Jyoti Primary School
5	Prakash BC	Yasok-1	58	Teaching	Economics teacher
6	Mahendra Khadka	Syabrumba-2	35	District committee member	Communist Party of Nepal-Maoist
7	Bhuminanda Khaitwada	Ranigaun-6	73	Ex-teacher	-
8	Purna Mifok Limbu	Yasok-7	33	Politician	Manch Sambadda Sanghiya Limbuwan Rajya Parisad
9	Mahendra Bahadur Lawati	Yasok-3	47	Politician	Sanghiya Samjyadi Party, district committee member
10	Rajkumar Shrestha	Yasok-3	52	Politician	Area committee member
11	Megh Raj Niraula	Yasok-3	51	Shopkeeper	-
12	Taranath Subba	Yosok-3	57	Chairperson	Yasok Bazar Khapane Upabhokta Samiti
13	Sese Falgu Fewadin	Yasok-6	26	Village development committee chairperson	Sanghiya Samajyadi Party Nepal
14	Narabahadur Khadka	Syabrumba -2	50	Coordinator	Khanepani Sankat ChetraTamor Pumping Aayojana Samyojan Samiti

SN	Name	Address	Age	Occupation/ Designation	Affiliation
15	Bhagendra Prasad Acharya	Yasok-7	47	Chairperson	Yasok Dugdha Byabasayi Sangh
16	Lal Bahadur Sambahamphe	Ranigaun-8	34	Reporter	Singha Lila FM
17	Chandra Bahadur Lawti	Yasok-5	60	Technician	Yasok Khanepani
18	Narendra Bahadur Lawati	Yasok-5	58	Village development committee chairperson	Rastriya Prajatantra Party Nepal
19	Jharendra Khatiwada	Syabrumba-2	38	Businessman	Ex-secretary of Federation of Chamber of Commerce
20	Cap. Rana Bahadur Lawati	Yasok-5	76	President	Nepali Congress Village Committee
21	Man Bahadur Limbu	Ranigaun-6	52	Businessman	-
22	Gopal Pokharel	Yasok-3	38	Ex-president	Federation of Chamber of Commerce
23	Narendra Bohara	Yasok-3	25	Chairperson	Federation of Chamber of Commerce
24	Sundar Fewadin (Limbu)	Yasok-6	32	Farmer	-
25	Bijaya Lawati	Yasok-3	28	Local mobiliser	LGCDP
26	Shyam Kumar Rai	Yasok-9	39	In-charge	Nepal Communist Party-Maoist
27	Raju Khatiwada	Ranigaun-6	40	Contractor	-
26	Gopal Khatiwada	Sabrumba-6	54	Business	-

SN	Name	Age	Address	Remarks
1.	Nanda Kumari Gharti Magar	52	Dauwa-9, Jeripokhara	Farmer
2.	Tika Gharti Magar	51	Dauwa-9, Jeripokhara	Farmer
3.	Prem B. Gharti Magar	47	Dauwa-9, Jeripokhara	Indian Army
4.	Kesh B. Gharti Magar	57	Dauwa-9, Jeripokhara	Now lives in Tamghas
5.	Dil B. Darji	41	Dauwa-4, Jeripokhara	Farmer
6.	Dika Gharti Magar	37	Dauwa-9, Jeripokhara	Farmer
7.	Sahila Darji	38	Dauwa-4, Jeripokhara	Farmer
8.	Bhim B. Gharti Magar	47	Dauwa-9, Jeripokhara	Farmer

SN	Name	Address	Remarks
1.	Tek Kumar Regmi	District development committee	Planning officer
2.	Dinesh Koirala	District development committee	Facilitator
3.	Babru Bahan Giri	Katike Deurali	President of Katike Drinking Water Preservation Committee, Panchkhal
4.	Sabitri Lamichhane	Discussion participant	President of Panchkhal Drinking Water Preservation Committee (DWPC)
5.	Prakash Timilsina	Discussion participant	Member of Panchkhal DWPC
6.	Madhav Prasad Nepal	Discussion participant	Member of Panchkhal DWPC
7.	Bir Bahadur Shrestha	Discussion participant	Member of Panchkhal DWPC
8.	Lrishna B. Shrestha	Discussion participant	Member of Panchkhal DWPC
9.	Prakash Sapkota	Discussion participant	Member of Panchkhal DWPC
10.	Rasman Tamanag	Discussion participant	Member of Panchkhal DWPC
11.	Ram Sharan Regmi	Discussion participant	President of Sathighar Bhagabati VDC DWPC
12.	Gopal B. Poudel	Discussion participant	Secretary of Sathighar DWPC
13.	Parbati Shrestha	Discussion participant	Member of Sathighar DWPC
14.	Phulmala Ghimire	Discussion participant	Member of Sathighar DWPC
15.	Ram B. Kunwar	Discussion participant	Member of Sathighar DWPC
16.	Kiran Shrestha	Discussion participant	Member of Sathighar DWPC
17.	Satya Narayan Shrestha	Discussion participant	Social worker
18.	Uttam Poudel	Discussion participant	Assistant pump operator
19.	Madhusadan Poudel	Discussion participant	Assistant pump operator
20.	Kumar B. Thapa	Discussion participant	Pump operator
21.	Ramesh Poudel	Discussion participant	Assistant pump operator
22.	Harisharan Ghimire	Discussion participant	Assistant pump operator

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