



Oxfam
International



Even the Himalayas Have Stopped Smiling

CLIMATE CHANGE,
POVERTY AND
ADAPTATION IN
NEPAL

**'Even the Himalayas Have
Stopped Smiling'**

**Climate Change, Poverty
and Adaptation in Nepal**

Disclaimer

All rights reserved. This publication is copyright, but may be reproduced by any method without fee for advocacy, campaigning and teaching purposes, but not for resale. The copyright holder requests that all such use be registered with them for impact assessment purposes. For copying in any other circumstances, or for re-use in other publications, or for translation or adaptation, prior written permission must be obtained from the copyright holder, and a fee may be payable.

This is an Oxfam International report. The affiliates who have contributed to it are Oxfam GB and Oxfam Hong Kong.

First Published by Oxfam International in August 2009

© Oxfam International 2009

Oxfam International is a confederation of thirteen organizations working together in more than 100 countries to find lasting solutions to poverty and injustice: Oxfam America, Oxfam Australia, Oxfam-in-Belgium, Oxfam Canada, Oxfam France - Agir ici, Oxfam Germany, Oxfam GB, Oxfam Hong Kong, Intermon Oxfam, Oxfam Ireland, Oxfam New Zealand, Oxfam Novib and Oxfam Quebec.

Copies of this report and more information are available at www.oxfam.org and at



Country Programme Office, Nepal
Jawalakhel-20, Lalitpur
GPO Box 2500, Kathmandu
Tel: +977-1-5530574/ 5542881
Fax: +977-1-5523197
E-mail: oxnepal@oxfam.org.uk

Acknowledgements

This report was a collaborative effort which draws on multiple sources, but was based largely on research produced by Wayne Gum and Prabin Man Singh with Bethan Emmett.

Even the Himalayas have stopped smiling: Climate Change, Poverty and Adaptation in Nepal

Lead Authors: Wayne Gum, Prabin Man Singh and Beth Emmett

Editor: Wayne Gum

Contributors: Sushila Subba, Karuna Amatya and all individuals interviewed

Photo Editor, Design and Print Coordinator: Anisa Draboo

Photographs: Bethan Emmett and Prabin Man Singh from Oxfam GB, Govinda Joshi and Paribesh Pradhan from ICIMOD Nepal

Contents

Executive Summary	i
Climate Change and Nepal	1
The Climate and Topography of Nepal	1
Climate Change is already happening	2
There is More Climate Change to Come	2
What Are the Likely Climate Change Impacts?	3
Who Are the Most Vulnerable to Climate Change?	5
“Even the Himalayas have stopped smiling” Nepalis speak about Climate Change	9
Climate Changes Observed	9
How people are adapting and what they need in future	19
Government Actions on Climate Change	23
Other non-governmental initiatives	25
Conclusions	26
Recommendations	28
Short Term Actions	28
Long Term Actions	29
Appendices	31
Appendix One: Persons Met	31
Appendix Two: Snapshot of Organisations Working on Climate Change in Nepal	33
End Notes	35

Climate Change, Poverty and Adaptation in Nepal

Executive Summary

In February and March 2009, Oxfam conducted interviews in rural communities in three ecological zones (*Terai*, Hills and Mountains) and in the Mid and Far Western Development Regions to capture a snapshot of how climate change is already affecting people living in poverty. The results were remarkably consistent with regional climate change projections, and deeply worrying.

Nepal's diverse topography, fragile ecosystems and extreme poverty make it very vulnerable to the negative impacts of climate change. It is one of the 100 countries most affected by climate change, yet it has one of the lowest emissions in the world - just 0.025% of total global Greenhouse Gas Emissions.

Nepal is one of the poorest countries in the world, with around 31% of its population of 28 million living below the poverty line. Most of Nepal's poor living in rural areas rely on rain-fed subsistence agriculture. They are vulnerable to extreme weather events; and often have poor access to information and lack resources to help them cope with and recover from weather-related disasters.

Climate Change is already happening and there is more to come. Temperatures are rising; glaciers are melting; rainfall patterns are changing.

- Average annual temperatures have increased by 0.06°C since the 1970s, with this figure much higher in high altitude Himalayan areas.
- Accelerated snow and glacial melt, has increased the risk of catastrophic Glacial Lake Outburst Floods (GLOFs) eg: Lake Imja Tsho, a glacier lake, did not exist in 1960; today it covers nearly one square km. The Imja glacier that feeds the lake has retreated 75 metres between 2001 and 2006.



"Before the rainfall was predictable. And we knew when to sow seeds, to plough land and to harvest. Production was sufficient to feed a family. Now rainfall is very uncertain and crazy. I have noticed a decrease in rainfall in the last 10 years and the monsoon is starting late. Maize production is hardly enough for 3 months to feed a family and we cannot get seeds from the last year's harvest...now we have 5 pathi (12.5 kg) of grain. This is the only food I have for the next year."

Dila Pulami, Taday Village,
Kalyan Village Development Committee, Surkhet District.

- Increase in extremes of temperatures. Days and nights are becoming warmer and cool days and nights are becoming less frequent. This is particularly the case at higher altitudes. More intense 'cold waves' that destroy winter vegetables are reported in the *Terai* region.
- More intense rainfall events causing more landslides and floods.
- Increasingly unpredictable weather patterns including warmer, drier winters, delays in the summer monsoon and more intense precipitation events affecting production of staple crops and resulting in declining water resources.

Climate scientists predict existing trends will continue, including more intense monsoons, more severe and frequent floods; less rain and snow in the winter and the continued retreat of the Himalayan glaciers, many of which are retreating faster than the world average. One study has predicted that with a 2°C increase in global temperatures by 2050, 35% of the present Himalayan glaciers will disappear.

What are the likely climate change impacts and who are the most vulnerable?

Nepal is already a country vulnerable to natural disasters particularly floods and landslides. Yet the country's diverse topography and ecosystems also make it difficult to detect patterns and plan national responses. With an increased intensity in monsoon rains, the risk of flash flooding, erosion and landslides will be increased.

Warmer and drier winters in the last few years have affected the winter wheat crop contributing to widespread food shortages while changes in the monsoon rain patterns have disrupted planting seasons and resulted in crop losses.

Warmer temperatures have increased the prevalence of vector-borne diseases such as malaria, *Kala-azar* or Leishmaniasis; as well as Japanese Encephalitis and water-borne diseases such as cholera and typhoid.

Reduced river flows due to reduced rainfall and glacial retreat, will make it harder to irrigate crops, operate hydro-powered mills and provide water for communities and livestock. It will result in a

substantially reduced electricity supply, since Nepal relies on hydropower for 91% of electricity generated.

However the impact of the glacial retreat will be felt far beyond Nepal's borders with the annual glacial melt from the Himalayas accounting for as much as 70% of the summer flow in the Ganges and 50-60% of the flow in Asia's great rivers. These could become seasonal should the Himalayan glaciers disappear and this could happen within the span of 30 years. The impact on riverine communities would be catastrophic and could affect up to 1.3 billion people in Asia including 500 million people in South Asia alone.

The predicted impacts of climate change will heighten existing vulnerabilities, inequalities and exposure to hazards. Poor and marginalised communities tend to be those most vulnerable to climate change and least able to cope with weather-related disasters because of lack of access to information and resources to reduce their risk.

The majority of Nepal's population are poor farmers reliant on rainfall and occupying small parcels of land that can barely produce enough food for the family. They are particularly vulnerable to climate change. They often live in areas most at risk to floods and landslides and are more reliant on local natural resources such as forests and water and would therefore suffer most from the drying-up of local water sources and changes to vegetation cover. Even small changes to rainfall patterns can have devastating consequences on their crops. Communities told Oxfam they used to grow enough food for 3-6 months of the year, but last year could only grow enough for one month's consumption. People are also fearful for this year's summer crops as there has been almost no rainfall.

Currently up to 3.4 million people are estimated to require food assistance in Nepal due to a combination of natural disasters (particularly winter drought) affecting agricultural production and higher food prices, reducing people's ability to purchase food. The 2008/09 winter drought in Nepal was one of the worst on record, both in terms of rainfall and also the breadth of the area impacted. It was also one of the warmest winters on record.

Although singular drought events cannot be attributed to climate change, these events are likely to

become more frequent under most climate change scenarios and the current situation could be an indicator of things to come.

Women are on the frontline of climate change. As men in many poor households migrate seasonally to seek work, the responsibility for feeding the family has fallen on women. They are walking longer distances to fetch water, fuel and fodder for the household and are increasingly taking on additional heavy burdens of wage labour as porters, construction labourers and domestic workers to ensure there is enough to eat.

What are people doing to adapt?

Some communities are already undertaking adaptation measures. These include changing crops grown from grain crops to vegetables. These can be sold as well as consumed, require less water and can be harvested quicker than rice or wheat. Improved water management is crucial (eg. catchment management, re-use of water and rainwater harvesting) as is improving non-agriculture income through small business enterprises and animal rearing. Implementing Disaster Risk Reduction (DRR) approaches have also proved effective eg flood mitigation works using 'bio-engineering' – the use of native plants to bind soils and stop erosion - and the development of early warning systems for floods. However, these examples are few in the face of the vast numbers of families facing climate related hunger and uncertainty.

The Government of Nepal has recently embarked on creating a National Adaptation Programme of Action (NAPA) that many hope will result in significant funding for climate change adaptation. Many activities are underway supported by a range of donors including those related to Nepal's accession to the United Nations Framework Convention on Climate Change. The non-government sector has also piloted a range of small-scale adaptation projects. However, awareness of climate change at the national, district and community level is still a challenge as is coordination of the many actors.

Complex climate change initiatives continue to progress at a slow pace in Kathmandu as evidence of climate change related impacts at the community level continues to grow. While the debate over distinguishing climate driven and poverty driven

impacts continues, it is becoming increasingly clear that for the poor living in remote areas of rural Nepal, help is needed now. There really is no time to waste.

Recommendations

Short term recommendations include:

- Immediate action to ease food shortages, focusing on the Hill and Mountain districts of the Mid and Far Western Development Regions and including measures to both address current hunger and to support affected communities to take advantage of the next planting seasons. This will require improved Government leadership and the development of a long-term strategy for chronically food insecure areas that is based on the climate change scenario of increasingly unreliable rainfalls.
- To raise greater awareness about climate change and its likely impacts; to ensure that discussions move beyond the science to the human impacts at the community level; and prioritise action to help. Importantly increased efforts must also be made at the community level, so that communities can play a greater role themselves and take the initiative in climate change adaptation and disaster risk reduction.
- Institutionalise existing successful models in tackling climate-related disasters into government policy. This is essential to reduce vulnerability to natural disasters that are predicted to increase as a result of climate change. Oxfam is calling on the government to revise its existing Disaster Management Act as a first step in developing appropriate policies and strategies for future climate-change related disasters.
- Interventions must meet the needs of vulnerable groups, including women and girls. Agricultural and technological advisory support should be designed and implemented according to the needs of the target groups that will include informal education strategies, school-based extension strategies for children and training that ensures effective participation. This will require a change in traditional agricultural extension strategies and the development of partnerships with non-state actors including the NGO and private sectors.

Long-term recommendations include:

- Support for rural livelihood adaptation in the key vulnerable regions. Likely strategies include the development of new crop varieties, farming system approaches that reduce weather related risk, improved water management, more diversified cropping strategies, improved market linkages, increased integration of livestock rearing, management of local natural resources and the development of community insurance schemes for key assets.
- Incorporation of Climate Change into national level planning. This will require line agencies and policy makers to actively identify and plan for climate change related scenarios and hazards in addition to ongoing disaster risk reduction approaches. This includes improved land use planning, catchment management and the development and resourcing of emergency contingency plans. The donor community should provide harmonised and sustained support for this process.
- Improved international advocacy: The impacts of climate change will be felt well beyond the borders of Nepal particularly in those countries that rely directly on the snow and ice of the Himalayas to feed the river systems that many of their populations rely upon. This includes inland China, Central and South Asia and the mainland of Southeast Asia. Nepal should engage in diplomatic discussions with these countries to form an Alliance of Himalayan Countries to call for ambitious global emission reduction targets and substantial support (financing and technological) for adaptation to be agreed in Copenhagen in December 2009. In addition, it is important for Nepal to work with India and Bangladesh to ensure a River Basin Approach that addresses management of their common river systems particularly in light of predicted climate change impacts. This approach should ensure that development projects along the common river systems are planned, reviewed and managed to minimise negative impacts on all riverine communities and that water management is made more equitable, effective and sustainable.

Climate Change and Nepal

“Warming of the climate system is unequivocal, as is now evidence from observations of increases in global average air and ocean temperatures, widespread melting of snow and ice, and rising global average sea level.”

Intergovernmental Panel on Climate Change, 2007¹

“Analysis of recent climatic trends reveals a significant warming trend in recent decades which has been even more pronounced at higher altitudes. Climate change scenarios for Nepal across multiple general circulation models meanwhile show considerable convergence on continued warming... trends have already had significant impacts in the Nepal Himalayas...”

Organisation for Economic Co-operation and Development 2003²

This report brings together existing literature on climate change in Nepal with interviews and discussions with people in 14 communities in seven districts in three ecological zones in the Hills and Terai regions as well as interviews with government officials, experts and climate scientists (see Appendix One: Persons Met).

The Climate and Topography of Nepal

Nepal is a small landlocked country situated in the central part of the Himalayan Range with an area of 147,181 km². Nepal's landscape is incredibly diverse. Within the space of less than 200 km from the 8,000m glaciers of the Himalayas to the tropical plains of the Terai bordering India, a vast array of fragile ecosystems houses a rich mosaic of people and an exceptionally high degree of biodiversity in terms of bio-climatic zones, ecosystems and species of plant and animals³.

The country can be divided into three general ecological zones as follows⁴:



“Winter rain is decreasing. Wheat production has been affected because of decreased rainfall and lack of snow in the winter. Villagers are sowing wheat twice this year but still the harvest is not good. The timing of the rainfall has changed. The monsoon is delayed; there is no rainfall in Ashad and Shrawan (June-July). Even the intensity of the rain has changed.”

Ganga Datta Joshi, Rosera, Baitadi District, 2009

Zone	Climate	Average Annual Precipitation	Mean Annual Temperature
Mountain	Arctic/Alpine	Snow/150-200mm	<3°C-10°C
Hill	Cool/warm temperate	275-2,300mm	10°C-20°C
Terai	Sub-tropical	1,100-3,000mm	20°C-25°C

The main populations are found in the Hill and Terai regions (44 and 48% respectively) with only 7.3% of the population living in Mountain areas⁵. More than three quarters of Nepal is covered by high hills and mountains producing more than 6,000 fast flowing rivers that flow from the Himalayas in the North to the Ganges River Basin in the South. These rivers are fed by the seasonal melt of Nepal's 3,252 glaciers and monsoon rains that occur from June to September and account for as much as 80% of Nepal's annual rainfall⁶.

Diverse topography and climatic conditions increase vulnerability to natural disasters

Nepal's rugged and steep topography, relatively intense precipitation regime and position in an actively tectonic area results in a ranking as the 11th most at-risk country from earthquakes, thirtieth from floods and one of the 20 most multi-hazard prone countries in the world. Natural disasters are considered a major impediment to achievement of the Millennium Development Goals (MDGs)⁷. Forty-nine out of Nepal's 75 districts are prone to floods and landslides claiming an average of 211 lives annually for the past ten years. In 2007 60% of the country was affected by floods and landslides affecting 70,000 families⁸. In 2008 flooding in the Western Region affected more than 180,000 people and in the Eastern Region a separate flood event affected 70,000 people in Nepal and more than 2.3 million in neighbouring Bihar State in India⁹.

Climate Change is already happening

Although meteorological data for Nepal is not comprehensive, there is evidence over the last 40 years of some changing climatic trends. These include:-

- Temperatures in Nepal have been increasing at an alarming rate. This trend has been consistent and continuous since the mid 1970s with an average annual mean temperature warming of 0.06°C between 1977 and 2000. Furthermore the warming was found to be more pronounced in the higher altitude regions and more so in winter compared to other seasons¹⁰.
- General increasing trend of temperature extremes. Days and nights are becoming warmer and cool days and nights are becoming less frequent. This is particularly the case at higher altitudes¹¹.

- Himalayan glaciers are retreating, faster than the world average¹² feeding glacier lakes that are growing at an alarming rate. Lake Imja Tsho is a remarkable example of a glacier lake that was nonexistent in 1960 and now covers nearly one square km. The Imja glacier that feeds the lake has retreated 75m between 2001 and 2006¹³.
- Although there are no definitive general trends in precipitation, there is evidence of more intense precipitation events. Analysis of flow patterns in certain rivers has indicated an increase in the number of flood days with some also indicating a decrease in dependable dry season flows¹⁴.

There is More Climate Change to Come

Accurate climate predictions are difficult due to insufficient meteorological stations in Nepal, particularly at higher altitudes, and the sheer complexity of the Nepali topography and climate. However analysis of a range of climate change models (General Circulation Models) has indicated a high likelihood that the warming trend observed in recent decades will continue into the 21st Century and there is a reasonable likelihood that the summer monsoon will intensify thereby increasing the risk of floods and landslides. Widespread glacial retreat is expected to continue, resulting in significant changes to hydrological regimes (flows) and increased risk of Glacial Lake Outburst Floods (GLOFs). As glacier melt accelerates, increased run-off can be expected initially followed by a steady decline. Declining winter snowfall with more precipitation falling as rain will result in declining spring and summer run-off but increased winter run-off. The most extreme projections forecast a decline in annual run-off of up to of 14%, threatening the feasibility of hydropower facilities¹⁵. Other studies predict that with a 2°C increase in temperatures by 2050, 35% of the present Himalayan glaciers will disappear. Runoff will increase peaking at 150 to 170% of initial flows between 2030 and 2050 before declining until the glaciers disappear between 2086 and 2109¹⁶.

The risk and impact of GLOFs is more predictable as Nepal has experienced 25 of these events in the past, the most recent in 1985 that resulted in a catastrophic flood. The flood wave that lasted for four hours released 6 to 10 million cubic metres of water and



*Photo: Paribesh Pradhan/ICIMOD Nepal
Dig Tsho Glacier Lake in Solukhumbu – Dig Tsho Glacier Lake (4,365m) burst on August 4, 1985 spilling an estimated 200 to 350 million cubic feet of icy water with a flood wave 35 to 50 feet in height. It partially destroyed a hydro-power project, 14 bridges and various trails and patches of cultivated land roughly 55 miles below and likely to burst again if climate change glacial retreat continues*

debris, partially destroying the Namche Hydropower facility and washing away large areas of land, homes, livestock and inhabitants of the area. In total 20 glacial lakes are currently considered GLOF threats¹⁷.

The predicted changes in precipitation are less clear. A study of temperature and rainfall for the period 1976 to 2005 throughout Nepal has indicated no general trends in rainfall with high inter-annual variability¹⁸. Winter rain is predicted to decline in South Asia under different global carbon emission trajectories by between 6 and 16% by the end of the century¹⁹. Other models predict increasing rainfall in Nepal mainly during the monsoon season and an increasing proportion falling in 'heavy' events²⁰.

What Are the Likely Climate Change Impacts?

There are inherent difficulties in attributing impacts on infrastructure, biodiversity, lives and livelihoods to climate change. Furthermore, Nepal's diverse topography and ecosystems further complicates attempts to detect patterns and plan national responses. However it is safe to say that existing vulnerabilities to climatic extremes will be magnified.

"We have been feeling it getting warmer for about 20 years – the rain is coming later and the land is drier. For 3 years there hasn't been enough rain, the wheat we grow is nearly dry and the seed is not good for planting either. We used to have enough water for drinking, washing our clothes and keeping goats, but now the water source is very dry. When I was younger we used to wear coats and feel cold in January and February, now we feel very hot."

Gagan Bhul, Tartar Village, Dadeldhura District

Nepal is a disaster-prone country, particularly to floods and landslides. With increasing intensity of rain events, these hazards will be increased. More variable precipitation will have a negative impact on agriculture, particularly the majority of farmers who rely on rain fed farming (only 40% of agriculture land in Nepal is irrigated²¹). With increased intensity of summer monsoon rain events the risk of flash flooding, erosion and landslides will be increased. With warmer winters, particularly at higher altitudes less precipitation will fall as snow further accelerating glacial retreat but also reducing soil moisture, and accelerating erosion.

“Landslides are becoming more frequent. Earlier we used to get rainfall for a week, but now its become sudden and intense. This rainfall can trigger more landslides than continuous rainfall.”

Male Focus Group, Rawatkot Village Development Committee, Dailekh District

“Reduced river flow has made water mills harder to operate. Earlier the mill was operational for 8 to 9 months in a year. Now the mill is running seasonally only in the monsoon.”

Male Focus Group Discussion, Kusapani Village Development Committee, Dailekh District

Warmer temperatures and increased precipitation in general may have positive effects on agricultural yields for key crops and may even open opportunities for new crops in certain locations. However, in general the overall impact of climate change in agriculture and on vegetation is unclear at the macro-level and given Nepal's diverse topography is likely to be variable depending on location.

Increased risk of disease, particularly vector-borne diseases such as malaria, *Kala-azar* or Leishmaniasis (a parasitic disease) and Japanese Encephalitis, as well as water-borne diseases such as cholera and typhoid, is a predicted consequence of increasing temperatures and rainfall²². The increasing occurrence of these diseases associated with rising temperatures has already been observed²³ and recent outbreaks of diarrhoeal diseases (with more than 240 deaths in 2009 in remote Hill and Mountain districts) has been attributed in part to water shortages due to winter drought and delayed onset of the summer monsoon²⁴.

In Dadeldhura District 60% of water sources are reported to have dried up in the past 19 years²⁵.

Changing hydrological flows both due to glacial retreat and increased (during the monsoon) and more variable (overall) precipitation will impact on the many irrigation systems, water-powered grain mills, hydropower plants and drinking water supply systems throughout the country. Nepal relies on hydropower for 91% of electricity generated and nearly all of these are 'run of the river' systems that do not utilise storage facilities and are therefore more vulnerable to variable flow regimes²⁶. The economic impact of reduced electricity supply is already being felt with extensive 'load-shedding' of up to 16 hours a day experienced throughout the country during the dry winter season. Reduced and more variable flows will affect irrigation systems and water supply that will impact on agricultural production and water and sanitation, leading to increasing levels of malnutrition and incidence of water-borne disease.

Importantly the impact of glacial retreat will be felt far beyond Nepal's borders with the annual glacial melt from the Himalayas in spring and summer accounting for as much as 70% of the summer flow in the Ganges and 50 to 60% of the flow in Asia's other major river systems (such as the Brahmaputra, Indus and Mekong).



During the last winter (recorded as one of the driest on record for the first time in memory), this 700 year old water source became dry, Dullu VDC, Dailekh District

Dullu VDC in Dailekh District, is known as a historical place with many examples of ancient constructions. In Pathari Nauli Gaun, a well constructed in 1276 BS (1216) (legend attributes construction to the time of the Mahabharata) can be found that continues to serve the local community throughout the year. But for the first time anyone can remember, last year the well became dry. Local people worry that this is a sign of climate change.

Recent analysis has suggested that if the Himalayan glaciers disappear these rivers would become seasonal and this could happen within the span of 30 years²⁷. The impact on riverine communities would be catastrophic and could include much of inland China, Central and South Asia and the mainland of Southeast Asia. The river basins in these regions are home to 1.3 billion people²⁸ and in South Asia alone (Nepal, India and Bangladesh) include up to 500 million people.

Who Are the Most Vulnerable to Climate Change?



“My family is vulnerable to climate change because we are farmers. If we had some other profession we would not be affected like this. Now there is no rain...we are having a hard time getting enough to eat.”

Dila Pulami, Tuday Village,
Kalayan Village Development Committee,
Surkhet District

Nepal is vulnerable to a range of natural hazards and it is the poor and marginalised who are most vulnerable. They are least able to cope with disasters, live in areas most at risk to hazards and generally have the least information, knowledge and resources to reduce their risk. The predicted impacts of climate change will heighten existing vulnerabilities, inequalities and exposure to hazards and will therefore impact most on those least able to cope.

Clearly, poor farmers will be the most vulnerable to more variable precipitation and increased risk of floods and landslides. They tend to be the most reliant on

Nepal: Basic Information (Source^{29, 30})

Population: 27.7 million

Gini co-efficient: 0.41 (highest level of inequality in Asia)

GDP contribution (2007/08): Agriculture 31%, Remittance 19.2%, Services 49.6%, Industry 15.4%

Population living below the poverty line: 31%

Incidence of poverty: Urban 9.6%, Rural 34.6%,

By Zone: Mountains 32.6%, Hills 34.5%, Terai 27.6%

By Region: Eastern 29.3%, Central & Western 27.1%, Mid-Western 44.8%, Far Western 41%

Human Development Index (HDI): 142nd out of 177 countries

HDI in rural areas compared to urban areas: 22% lower

Population food insecure: 6.4 million

Children acutely malnourished nationally: 13%

Annual child mortality due to diarrhoeal illness: 28,000

Water sources micro-biologically contaminated: 55-85%

National literacy rate (2003/04): 50.6
Female 38.9, Male 63.5, Dalit 33.8

Life expectancy: National average 59, Dalit average 50.8

Population engaged in subsistence agriculture: 80%

Landless: National 24.4%,

Irrigated agricultural land: 40%

rain-fed agriculture and tend to occupy the most marginal land that are often most at risk to flood and landslide hazards. Even small changes to rainfall patterns can have devastating consequences throughout the growing cycle. Alarmingly nearly 60% of rural households are *functionally landless* with insufficient land to meet their basic food requirements³¹. They are therefore more reliant on local natural resources such as forests and water and would therefore suffer most from the drying up of local water sources and changes to vegetation cover.

Within the various ecological zones of Nepal, the incidence of poverty is highest in the Mountain and Hill areas and within these areas the Mid and Far Western Development regions. These zones are also



Due to the winter drought, this agriculture land has been left uncultivated, Taday Village, Kalyan VDC, Surkhet District

considered the most food insecure. The World Food Programme currently estimates that up to 3.4 million people require food assistance in Nepal due to a combination of natural disasters (particularly winter drought) affecting agricultural production and higher food prices (that reduces the capacity to purchase food). The 2008/09 winter drought in Nepal is considered one of the worst on record in terms of rainfall but also the breadth of area impacted. In addition the 2008/09 winter was also one of the warmest with many districts particularly in the West recording record maximum temperatures³².

Although singular drought events cannot be attributed to climate change it is important to note that declining winter precipitation and increasing winter temperatures are predicted climate change impacts. The recent winter drought experienced in Nepal according to climate change predictions could be an indicator of things to come.

The most vulnerable families are forced to exercise coping strategies that include skipping meals, consuming less, consuming seed stock, sale of assets (such as livestock) and migration in search of work.

“Normally we would crop maize during the summer monsoon and wheat during the winter, but production of wheat has decreased substantially in the last few years. We are only harvesting one crop a year due to the lack of winter rainfall and irrigation.”

Male Focus Group Discussion, Kalyan VDC, Surkhet District, Mid-Western Region

“The production of wheat (in Dailekh) has reduced by 9.50 metric tons in the last year. This year there has been no rainfall in winter so the expected rate of loss is 60-70% and with the hailstone on March 25th the rate of loss may be more than this.”

Surya Nath Yogi, District Agriculture Office, Dailekh District, Mid-Western Region

Seasonal migration for wage labour (in rural areas commonly to India-40% but also within Nepal-30% and for those with resources to -countries outside

South Asia) is a widespread coping strategy for poor rural families to the extent that 44% of households across Nepal have one or more family members absent pursuing labour opportunities. Even where remittance

is low and the risks can be high (including exploitative and dangerous working conditions, exposure to theft and disease etc.) men often leave simply to ease the strain on the household of feeding one more person. Seasonal migration is closely linked to agricultural production, food security and debt³³. With increasingly variable rainfall patterns, an increase in food insecurity may result in an increase in migration that will in turn place more burdens on the remaining family members; women, children and the elderly.

“Male members migrate to Malaysia, and Arab nations for work. This has increased our workload. Increase in work is restricting us from taking our young children to school. It takes an hour to reach the school.”

Arjun Dhara Disaster Management Committee
(female members), Jhapa District

“There’s too little water to produce decent crops, so instead of earning money from agriculture we have to work as casual labourers. Sometimes we go to get loans, but people don’t like to lend money to Dalit people and we don’t have many options, the lenders take advantage of this and charge us very high rates.”

Gagan Bul, Tartar Village, Dadeldhura District

Vulnerability is compounded by geographic isolation with many districts (in the Hill and Mountain regions) poorly served by roads and other infrastructure, and often isolated by landslides and floods. Access to government services and markets as well as information and technical support is limited. Furthermore, vulnerability is compounded by widespread systematic discrimination by gender, ethnicity and caste throughout Nepal. The poorest development regions also correlate with a proportionately higher population of Dalits (the so-called ‘untouchable’ caste) and ethnic minorities. Within these groups women are further marginalised. Women, Dalits and ethnic minorities



With the men of many families migrating to India for seasonal work and declining farm production, women are increasingly taking on more hard labour to generate extra money to feed their families, Gaira VDC, Doti District

“We are coping by working as day labourers, but we need our own work”

Parvati Tamata, from Laligural Savings and Credit Group in Badhauri Village, in Dadeldhura District in the Far Western Region, explains the strains the changing weather is adding to their already difficult lives. Badhauri is a mostly Dalit village and few women and girls have an education.

“The men migrate to India and come back once or twice a year. Sometimes they bring back NRs. 5000-7000 (USD64.94 to 90.00), sometimes they bring back nothing. We women do work as casual labourers carrying stones, doing domestic work. Now we have some savings too (from an Oxfam supported savings and credit scheme), which we use to grow vegetables – we can earn some cash this way, some we eat ourselves.

Before the savings and credit group we had to ask for loans from higher caste households and they were difficult to get. Men and women get different wages for labouring work – we get NRs. 80 per day (USD1.04) compared to men who get NRs 150 (USD1.95) - but men smoke cigarettes and women work harder, so why shouldn't we get the same pay?

As women we don't own land, we have been growing vegetables on other people's land and we give him (the land owner) half the harvest. Now there is no rain so we can't plant in time, and when we do manage, it doesn't grow well. Everything has been changing. Before, there were plenty of crops to share with the landowner and to eat ourselves. Now there is a lack of nutritious food so women are getting older sooner. We have also lost our access to the local forest, so collecting fodder is harder.”

tend to own fewer assets including land and livestock, receive lower income, tend to have lower levels of education and less access to community and government services.

Women in particular are exposed to violence both within the home and in the community, and bear disproportionate responsibilities in the home and increasingly as income earners and producers. Their

mobility is limited by household responsibilities and social practices that limit social contact outside their immediate families. Their ability to earn an income is limited by opportunity, generally lower levels of education and literacy and discriminatory remuneration practices. This is particularly important during the long periods when men have migrated for work leaving women, children and the elderly to meet their own needs as well as manage the home and fields.

"Even the Himalayas have stopped smiling" Nepalis speak about Climate Change

Despite the range of geographical locations where discussions took place (14 communities in seven districts in the three major ecological zones), there was a remarkable similarity in people's experiences and perceptions of climate change.

Climate Changes Observed

Warmer, drier winters and a lack of winter rain and snow

In every community visited, the main concern of the people was that winter is getting much warmer and drier. Everyone reported that winter temperatures have been rising and rainfall declining steadily for the last 15-20 years. In many Hill areas, wheat is the major winter crop. Wheat is more vulnerable to rising temperatures than other crops such as paddy³⁴.

The quantity of winter rain is reported to be less and the onset of winter rain is often delayed. In addition people talked of more hailstorms destroying crops just before harvest.



"Before snow used to fall in Mangshir and Poush (November - December), now there is very little snowfall even in Chaitra (April) - even the Himalayas have stop smiling. This unfavourable weather makes us unenthusiastic about farming."

Lalita Sapkota Rawatkot Village Development Committee, Dailekh District

"20 years ago it was very cold from Mangsir till Magh (November till January) and summer started in March. It was so wet that mushrooms used to grow on buffalo horns. Nowadays it is not cold; there has been much less rainfall in the last three years and no snow. The quality of the rain has changed too - there is no drizzling rain which is good for the soil, and hail storms are coming more often"

Sarbajit Thapa, Kushapani Village Development Committee, Dailekh District

"Wheat production in the high hills used to be helped by the snow - first they spread the seed, then the snow would come and this would melt slowly into the soil, providing enough moisture for the seeds to germinate and grow. 15-20 years ago we only had to plough once, its more work to plough the crops now because the earth is drier and harder, and we are worried all the time about getting the right amount of water for the crops - it's a struggle."

Anirudra Prashad Bohora, Bag Bazaar Farmer's Cooperative, Dadeldhura District

The last three to five years have been extreme, with a lack of rain and snow that normally falls in hilly districts from December to January. People were particularly worried by the severe drought of the 2008/09 winter, when almost no rain or snow

fell. The lack of snowfall means less precipitation for winter crops, but also less soil moisture as snow percolates into the ground gradually improving the soil moisture content and raising the water table.



Winter drought results in a poor wheat harvest, Tatar VDC, Dadeldhura District



“There’s been hardly any rain for three to four years. The planting and harvesting seasons are out of time. The winter wheat crop in particular has been bad. We are totally dependent on rain, we have no irrigation systems, and now our water systems are declining and we are not feeling cold as we should be during winter. If it continues like this there will be a disaster.”

Laxmi Devi Sarki, Badhali Village, Dadeldhura District

“We are so worried the rain won't come”

“I am Binita Bishowkarma. I live in Kaphala Village, Baitadi District with my husband and children. Before help from NGOs we didn't have many sources of income. We used to collect grass to sell as fodder - we would get paid NRs. 30 per day (USD0.39) or the women went to higher caste families to work as domestic servants. The menfolk were doing agricultural labour on others' land, or portering sand and bricks, earning NRs. 50 (USD0.65) per day; some work as guards in Punjab, Bangalore or Kolkata in India. Sometimes they can bring home NRs. 10,000 (USD129.87) per year, sometimes it takes two to three years to earn this much. Each family in our village has a little land, around 1 khata (0.03 hectare). Previously we could only grow maize, but now with assistance from NGOs we can grow vegetables to sell locally. We're growing potatoes, spinach, pumpkin, brinjal and some women keep chickens and goats and some have buffaloes or cows.



Before it used to snow in the winter, and the winter was much colder - we think the temperature has been increasing since the road was built about 25 years ago. But in the last three years there has been no snow, and in one of those years we had only two days of rain. So now the plants are dying. We are supposed to harvest wheat in March but the plants are very small. Fruits like peach, lemon, pomegranate and peas are supposed to be flowering now but its so dry it is not happening. When we go to collect fodder for the animals the trees and bushes are dry as well.

This year has been the most difficult time for weather. We are getting ill more because we're not eating properly. Before this dry weather we could eat the vegetables and fruit we grew and be healthy, but now the rain hasn't come so fresh leafy vegetables aren't available in our gardens and those that grow, the quality is not good. Cabbages are limp and diseased inside, full of insects. We have to buy vegetables at the market now, but the quality isn't good, and they're expensive. Water is the main thing. If its gets hotter and drier and there's no water to even wash our clothes or clean the house. March-April is the dry season, we are so worried the rain won't come afterwards, our hopes are low”.

The monsoon is unpredictable, seasons are changing, and rainfall is more intense

Nepal normally has a fairly predictable summer monsoon, generally starting in May/June and lasting until September. Now people in all areas visited are reporting greater unpredictability in the arrival and

intensity of the summer monsoon – sometimes early, but most often delayed and lasting for less time. This is often reported as ‘less rain’ as the number of rainy days is less. Some caution is needed in interpreting this, as scientific data shows variable rainfall over the last 30 years depending on the geographic location. The perception of ‘less rain’ is

“The monsoon is squeezed into hardly two months. For several years now the monsoon has been delayed and the rains are not timely. There is no stability in the cold or summer seasons.”

Khagendra Lingden, Khudanabari Disaster Management Committee, Jhapa District

“Earlier the (intense part of the) summer monsoon rain used to last for 7-15 days. Now the rain hardly remains for three days. Instead there are long dry periods followed by heavy rainfall, which causes soil erosion.”

Mixed Focus Group, Kanchanjunga Disaster Management Committee, Sanischare, Morang District



“There has been no rain this winter, and the monsoon doesn't arrive on time. The rain should arrive after we harvest the wheat, but it is arriving before with hail and is ruining the crop. Our harvest is down.”

Gauri Devi Bohora,
Alatal Village Development Committee,
Dadeldhura District

“Excessive rainfall and wind is destroying our maize crops. For the last 15 years hail has been frequent and intense. Now rainfall is followed by hailstorms. Generally in Ashoj (September) and Falgun/Chaitra (February/April), hail has destroyed the standing crops.”

Lalita Sapkota Rawatkot Village Development
Committee, Dailekh District

“When I was younger there was enough grain to eat. Since 11-12 years ago it has been reducing. The river used to flood our land in the monsoon, that's not happening anymore. We are cultivating the same crops we used to: rice and wheat; but today there is far less yield.”

Gauri Devi Bihora, Alatal Village Development
Committee, Dadeldhura District

more related to the usefulness of the rain with regard to people's main livelihoods – agriculture. In this context the predictability, intensity, form (rain, snow or hail) and continuity are more important than overall quantity.

People report the monsoon downpours lasting for fewer days than usual and falling with much greater intensity, often with hail. The water quickly washes downhill without permeating the soil, destroying crops and in some cases triggering landslides.

Many feel the seasons are shifting with delay in onset of the rains and increasing temperatures resulting in early flowering of wild berries and flowers. This is changing when people plant and harvest crops and causes uncertainty about what will grow when. Lost crops mean less food and increasing vulnerability to additional shocks.

Decline in food crops and food security

The immediate impact of more variable and unpredictable rain has been a dramatic reduction in crop production, particularly winter wheat, one of the staple food crops in many Hill districts. In many communities people talk about a halving of food production compared to the previous years on the same land. Where families used to grow enough food for three to six months of the year, they talk of growing only enough for one month's consumption last year and are fearful for this year's summer crops as there has been almost no rainfall.

“With landslides and now droughts - everything is expensive, prices are rising.”

Female Focus Group, Tartar Village, Dhadeldura

“There will be nothing to eat for the next year”

Dil Bahadur Pulami, 75, was the first man to settle in Tудay Village in Sukhet District back in 2023 BS (1966) with his family. Now the village has 24 families. He remembered when he first came the village was prosperous. They used to harvest three crops in a year. There were few mouths to feed and the production lasted the entire year.



“We did not buy seeds. We separated seeds from the present harvest for the next year. We are following this practice for ages. Something has changed in the last two to three decades. Production is declining over the years. We tried hybrid seeds, chemical fertilisers and pesticides but the production is still declining. The cost of production has increased substantially. Earlier we used cattle dung as manure. Now we do not have enough cattle and dung is not sufficient. Hybrid seeds need chemical fertilizers and pesticides. We tried everything, but rely on rainfall. Our fields need timely and sufficient rainfall as we do not have irrigation. But rainfall is beyond our control. Especially in last three to four years, there is much less winter rain. Many families have kept their land fallow in winter and migrate to cities and India for work. Returns from wheat production are less for farmers.

But I am still hopeful. I have kept 40 kgs of seeds. I sowed half of it last month. But the seeds dried in the field. Not a single seed germinated. That was a waste. I still have rather less than 10 kgs. But the family is eating seeds. We have not done this before. Now I am thinking whether I should feed the family or wait for rain. In both cases there will be nothing to eat for the next year.”

Declining food production means that people will have to rely more on purchase of food and are therefore more vulnerable to rising food prices. Those with more assets such as land and livestock and more importantly, off-farm incomes are in a better position to buy food. However, for the families interviewed, off farm income is limited to casual labour either locally (on other people's farms or as porters), in nearby urban centres (often the construction industry) or further away either in Nepal or India (including agricultural and construction labour, portering, as guards etc.). Some families (in Dailekh, Dadeldhura and Surkhet districts) had access to World Food Programme support that appears to be an important source of food that highlights the importance of even small levels of support and the relative value of migration in terms of access to food. This support included Food for Work and School Feeding Programmes.

“The food for work programme is good for us (5 kg of rice per family for one day's work for three to four months of the year) - we get about the same amount of money we earn migrating to India, but at least we can stay with our families. We would like to have this programme all year round.”

Dil Bahadur Pulami, Tудay Village, Kalyan Village Development Committee, Surkhet District

Rivers drier, lack of water for drinking, washing, irrigation and livestock

People interviewed spoke of less rainfall resulting in river levels dropping and streams drying out. This made it more difficult to irrigate fields, operate water mills and provide water for livestock.



"I have been here in this village for 40 years. I remember during the rainy season the river used to come up to our stomach and it was a problem to walk across the tracks and fields because the mud would come up to your knees. For three months we couldn't cross the river. Now there's been so little rain recently, it (the river) only comes up to our knees even in the rainy season. We are worried about the amount of food we're growing; we have to work so much harder to grow the same things..."

Laxmi BK, Kaphala Village, Baitadi District

"Compared to other districts Dailekh still has good water resources. But there are no rules and regulations to protect available water resources. There is competition to register water resources, even for small sources but nobody is thinking about their protection and management".

Surya Nath Yogi, District Agriculture Office,
Dailekh District

Women talk about having to walk further to collect water and carry more water for livestock that previously used to drink from nearby streams. Older people talked about dramatic drops in river levels over the last 30-40 years. Water shortages have been compounded by population growth and an almost complete lack of water harvesting, storage or collection practices. Traditionally water has always been available and much of the rainfall simply drains off the land without being used. Many people interviewed recommended increased emphasis on water resource management with the support of local authorities.

But even where people have been storing water and starting to grow vegetables to earn more income this is being undermined by drought and rising temperatures. Water storage tanks, tap stands and greenhouses for vegetable production are underused because of lack of rainfall and failing water sources. It implies that these strategies will need to be re-designed to adapt to further reductions in water supply.



Women are travelling further to collect water as other sources have dried, Baitadi District

Terai plains: more intense 'cold waves' are destroying crops

"The period for cold waves has shortened. In 2053 (1996) cold waves used to last for 15 days. Now they only last for a few days. But they're 'thicker', with more fog and more cold which damages vegetables especially potatoes, tomatoes and mustard. And we have to use more pesticides to protect the crops."

Mixed Focus Group Discussion, Kanchanjunga Disaster Management Committee, Sanischare, Morang District

"The longest cold wave we had was for 15 days in 2037 (1980). But in 2063 (2006), it lasted for 2-3 days. Cold waves have damaged vegetable cultivation, especially potatoes, mustard and spinach, the damage from cold waves these days is much more than before."

Rajghat Disaster Management Committee, Morang District

Some communities in the Terai talked about the increasing intensity of 'cold waves' during winter that are damaging winter vegetable crops. It is unclear if these events are becoming more or less frequent but importantly, their intensity appears to be increasing. Cold waves are foggy days characterised by low temperatures due to the absence of sunshine, high humidity and low visibility. In general the frequency of cold waves in the Terai plains has increased over the years but there can be inter-annual variations in their strength and duration³⁵. Winter cold fog events in the Terai region have been observed to have become more frequent in the last decade and to last longer - up to one month³⁶. Similar observations have been documented by Oxfam in Bangladesh and Vietnam, where communities talk of shorter and more intense cold snaps with thick fogs and frosts that destroy vegetable crops³⁷. It is possible that the increased moisture and humidity is providing a favourable environment for fungal disease of these crops but more research is needed³⁸. Although it is unclear how these observations relate to the predicted climate change impacts, it does fit into the general pattern of more extreme and unpredictable weather.

Floods and inundation becoming more common in the Terai

"Major floods have occurred since the 1970s which have affected one third of the village and washed away a highway bridge. Now floods are less intense and shorter, but happen more frequently and abruptly. Before floods occurred after continuous rainfall of many days. Now heavy rainfall for a few hours can result in floods. We now have very short time to response to floods."

Khudanabari Disaster Management Committee, Jhapa District

"About every 10-12 years we get a big flood in this area. The reasons for flooding are unmanaged settlements and deforestation. Rainfall is less now but deforestation is causing the flooding."

Male Focus Group, Madhumalla Disaster Management Committee, Morang District

Flooding is a normal part of the annual cycle for people living in the flat Terai plains, where farmers depend on seasonal flooding to irrigate their crops. But people in Jhapa and Morang districts in the Eastern Terai talk of a marked change in the intensity and timing of flooding, with the flooding season delayed, flood events less intense but more frequent, and occurring much sooner after rain events even when the volume of rain has been less. In Nawalparasi District in the Central Terai people talked of more intense downpours, giving people less time to react to flood threats, and leaving the land waterlogged.

These observations are likely to be related to deforestation in the upper catchment areas causing rain to run off the land quicker causing flash flooding. This highlights the impact of human interventions on local flooding such as deforestation, construction of canals and, in one community, extraction of sand from riverbeds.

For example in Nawalparasi District, the observed increase in flood events is likely to be a result of changing rainfall patterns causing changed river flows interacting with human interventions such as the

construction of bridges, roads and canals. This highlights the importance of planning and designing infrastructure works around not only existing flood patterns, but around predicted future flows.

"It is hard to derive any trend from an inventory of floods of last 25 years. But floods events and causalities are increasing over the years. In recent decades, no major floods were reported in the big rivers such as the Koshi, Gandak, Karnali and Mahakali, except in the Koshi last year (largely related to poor management of the embankment). These rivers are largely glacier fed. Medium rivers like Babai, West Rapti, Tinau, Bagmati are overly utilised. Vulnerability along these rivers is very high. But the most worrying are small and seasonal rivers. These rivers are rain-fed. Rainfall has been delayed and is very intense. Flash floods are unpredictable and damaging."

**Basistha Raj Adhikary, Senior Division Engineer,
Department of Water Induced Disaster Preparedness.**

Oxfam works in flood-prone communities in eight districts in the Terai region and in nearly all, affected communities talk of the increasing unpredictability of flood events as well as occurrences of localised drought that can devastate one community's crops while another nearby community suffers floods. This highlights the localised nature of these kinds of impacts, their complex causes and the difficulty in distinguishing root causes. However, regardless of the actual causes the application of well planned and executed Disaster Risk Reduction (DRR) activities have proved to be highly effective.

"Unpredictable but intense rainfall is creating flood havoc. When we are expecting rain there is not a drop but sudden intense rain floods the village. It is increasingly important to prepare ourselves for floods as responses are becoming much more difficult."

**Male Focus Group Discussion, Rampurkhadauna VDC,
Nawalparasi District**

Floods are becoming more frequent and faster leaving people less time to respond, Rampur Khadauna VDC, Nawalparasi District



Case Study: Recurring floods, more intense and damaging

Rajghat Village Development Committee (VDC) is located along the bank of the Mawa River. In 2029 B.S. (1972), floods hit the VDC for the first time. Then subsequent floods in the next two years diverted the flow of the river by five kilometres. The river intruded into densely settled areas. Four adjoining VDCs were badly affected then. In every 10-12 years, a big flood hits the VDC. Floods now are more damaging than floods before.

"Heavy rainfall in the Siwalik Hills triggers flash floods downstream. Rainfall has been unpredictable, so has the floods. Earlier we could predict when floods will hit the VDC and prepare ourselves. But now, our prediction is becoming less reliable. In some years the rains start in March/April but in others they start in August. Now we have to live for longer periods in fear of being washed away.

Unplanned settlements along the riverbank and deforestation are aggravating damage from floods. The monsoon is not the same. Suddenly rain starts and stops. Water levels in the river rises, does damage and then recedes. There is no time to respond."

Mixed Focus Group Discussion, Rajghat Disaster Management Committee, Rajghat VDC, Morang District

Women are on the frontline of climate change

In nearly all communities visited, the absence of young men of working age was noticeable. Men and boys even as young as 10 were found to be seasonally migrating, mostly to India to work as casual labourers in construction, as porters and hotel staff. Migration patterns are closely linked to the agricultural cycle with men and boys leaving shortly after planting time (June

"We are coping by working as labourers. We have to work harder now doing work like carrying sticks and stones and farming for higher caste families. But we don't really know how to cope with these changes. You have to tell us what should we do. What are you going to do to help us? We can work hard but we need money first, we need some skill or some training, something other than portering. We need the opportunity to do our own work."

Parvati Tamata, Badhauri Village, Dadeldhura District

"It can take women a 3-4 hour round trip to collect firewood, many women leave home early - at 4am to start collecting. Girls collect water and tend animals, they're used to very hard labour"

Female Focus Group, Tartar Village, Dadeldhura District

"We are totally dependent on rain for agriculture. If the rain doesn't come we women go to earn money as casual labourers and domestic servants. Irrigation is crucial, we need help to irrigate our crops, we have been so disappointed in the weather conditions recently."

Female Focus Group, Kaphala Village Development Committee, Baitadi, District





Women carrying firewood, Khordepe Village, Baitadi District. Women and girls are increasingly bearing the brunt of climate change through increased hard labour

depending on the season) and returning for festivals and the harvest (October to December). In the Terai where there is extensive agricultural land on both sides of the border, men are able to find work much closer to home, sometimes on a daily basis but in the hills with greater distances to be covered, men are absent for long periods.

With the absence of menfolk women, girls and boys are left to manage the household including both domestic roles (child rearing, cooking, cleaning, collection of water and fire wood etc.) and productive ones (tending livestock, producing crops and earning income). With the increasing unreliability of agricultural production because of increasingly unreliable weather conditions, changing (adapting) farming practices and earning off-farm incomes become extremely important.

Many women and girls spoke of an increase in work - both paid and unpaid - to manage the home and also to earn money to buy food. In Baitadi, Surkhet and Dailekh districts women reported the increased distances they must travel to collect water, fuel and fodder for the household. They also spoke of the need to now collect water for cattle because rivers and streams are drying out.

Increasingly women are also working as labourers and porters to earn money to buy food and other essentials. This increased workload is impacting on the



“Because we're working so much more we have to keep our children home from school”

"There has been no rain this winter, and the monsoon doesn't arrive on time any more. Four or five years ago we grew enough rice and wheat to eat for five months, now it is not enough for one month. Before we had lots of green vegetables, fruits and sugarcane, but now we can grow very little, only where there is water close by.

I have three sons, three grandchildren, and two daughters-in-law. Whenever the fields don't produce enough they all have to do casual wage labour to make ends meet. We women are having to do more labouring as we can't make a living from the land, and the men have already had to leave to seek work in India.

It is having an impact on our children's schooling - we try to protect them and education is the first priority, after eating. But because we're working so much we often have to keep our older children home from school to look after the younger children and our livestock. Because we are spending more on food we are spending less on their education.

Still now we don't know what to do to cope with these changes. We need some training and guidance, we need some support. Even if one or two women in the community could be trained in tailoring they could train the rest. We don't know what our best options are for the future."

Padma Bohora, Alatal Village Development Committee, Dadeldhura District

whole family. Some women spoke of not having time to take children to school, or having to withdraw older children from school in order to look after younger children and livestock whilst their mothers were out working. Some women also mentioned the need to take on traditionally male physical tasks such as ploughing.

How people are adapting and what they need in future

Adapting to climate changes is possible - at least for the present - and there may even be advantages where growing seasons are extended, or new crops can be grown. This however requires information and resources to take on the risk of trying something new in an increasingly unpredictable environment. The poorest are the most vulnerable to predicted climate changes and have the least resources to cope, mitigate, recover and adapt.

"There's no rain, what can we do? We only know how to farm and that's not enough. Some people are keeping livestock, some are migrating for money, some are labouring for wages - people do what they can."

Padma Bohora, Alatal Village Development Committee, Dadeldhura District

"After testing the soil and getting advice we think we can get more money from planting ginger and turmeric - they don't need much water, unlike rice and wheat. Other options are farming goats and chickens. But we need support to do so. In future the government and NGOs need to build capacity in the villages, in our communities, rather than sending experts. If the government has a system to subsidise seeds for marginalised communities that would help us. Also we don't have enough water, even to drink. Those who grow vegetables have to fetch water from small streams far away. We need advice about crop irrigation. We need industry and jobs to come here too, to use our agriculture and produce jobs for local people."

Karna Bahadur KC, Tartar Village, Dadeldhura District

Changing farming practices

Some communities met are trying to adapt to the warmer winters and erratic rainfall by growing different crops, such as vegetables, instead of rice and wheat that need more water. Vegetables are also a cash crop that does not require large tracts of land and can be harvested faster than more traditional grain crops. Fruit cultivation is also an alternative, such as bananas that require little land. People visited however expressed the need for much more support to make these ventures successful, including technical advice, access to seeds and loans as well as improved infrastructure such as roads or greenhouses. Furthermore, some communities identified cultural reasons why some

"We're trying some new things as well, planting crops like mustard leaf, radishes, and coriander at different times, now we're planning to plant them in summer instead. We're using small plots to test this out, but it might not work, it is becoming risky."

"Rice is better in the lower land, its not doing well in the high hills anymore, but people still plant it anyway because it is their staple food."

Bag Bazar Farmers' Cooperative, Dadeldhura District



As rains are becoming more unpredictable people are switching to vegetable farming, Kaphala, Silanga VDC, Dadeldhura District



Water harvesting pond used to irrigate vegetables, Rosera VDC, Baitadi District

people feel unable to switch crops. People spoke of 'having to plant rice, even if there is no rain' and 'feeling poor if they haven't eaten rice'.

Improving water management

Even where people were trying to make changes, the lack of water is undermining recent progress in income generation and making any new ventures more risky and difficult. Water management is not a widespread practice but increasingly people are starting to harvest rainwater and re-use water. Simple practices such as building small ponds or installing rainwater tanks to collect rainwater for consumption and to irrigate kitchen gardens are becoming increasingly popular as are steps to improve the re-charge of water sources through construction of check dams and reforestation of catchment areas.

"If there is water, we can manage everything else."

Sanu Devi Sarki, Tartar Village, Dadeldhura District

"There is not sufficient water in a river to operate eight water mills. We decided to reuse river water. Instead of channelling back to the river, water is diverted to the second mill and from the second to third and so on. This way all mills can function. But in the rainy season each mill has its own canal."

Lalit Sapkota, Kusapani Village Development Committee, Dailekh District

Improving incomes

People often spoke of the need to earn incomes independently of farming - often mentioning (caste-specific) old skills and professions such as tailoring, pot-making, basket-weaving and other cottage industries. Income diversification is suggested as a key livelihood strategy and coping measure. In some areas simple savings and credit schemes have provided the opportunity for poor people to build their livelihood assets such as through rearing of goats. Goats can be sold during times of shortages and can

Changing crops isn't enough without water

The women of Tartar Village sat in hot, sunny weather in February, explaining the changes they have noticed. Normally in this season they explained, there would be snow on the ground and they would be wearing coats and hats. Last year the monsoon was insufficient too, and they are worried about the coming monsoon. They spoke of 'not feeling cold enough' during the winter, with the unusual heat making them feel sickly and worried.

Manu Devi Sarki, President of the Bhagiswor Fresh Vegetables Group Tartar Village Development Committee, Dadeldhura District, which has been helped by Oxfam, said: "There has been no benefit from the hot weather, we're worried about growing enough food. We have learnt how to produce fresh vegetables, and have changed to growing vegetables (for cash) instead of wheat and rice. For two years in a row we have earned around NRs. 40-50,000 (USD519.48-649.35) per family from doing this. But this year production has been very low; we've had a very poor crop because of poor rains. Earlier we didn't need to travel far to collect water and there was always enough. Now water flow in taps near houses is very low, and rivers are running low. We don't know which crops will flower and harvest anymore. We're very worried for the children. WFP (World Food Programme) provides school meals, but this is stopping soon so there will be an increase in the price of food."

When asked what she will do for the future she sighed..

"We don't know what to do for the future. If we get a small piece of land, or maybe some training for us women... I'm not sure what type of training we need, but something which is alternative to agriculture, like tailoring. We also want to increase vegetable production and we have learnt how to do this, but we need further technical support".



"We need money to farm goats and chickens. We can work hard but we need the money to invest first. We need some skill or some training, something other than portering. We need the opportunity to do our own work. As Dalits we used to have the skill of making brass pots. If someone could provide the machinery to do this we could build our own living, we were skilled at that."

**Teekeshwori Devi Tamata, Badhauri Village,
Dadeldhura District**

"I took a Rs. 3000 (USD38.96) loan from the group (savings and credit) to purchase a she-goat. I have two baby goats now. I have already repaid the loan with interest within 6 months. If it is a male goat I will sell it. If it is a female I will keep it and it will give birth in a year. A mother goat cost Rs.5000 (USD64.94) and a baby goat cost Rs.2000 (USD25.97) these days. This encourages me to earn alternative income from goat rearing. We women like goats very much. They are easy to manage and we can improve our lives."

be easily fed from fodder collected from local forests. Other people have used credit for planting other crops that can diversify their income.

Local initiatives can work

Another important initiative has been to plant vegetation to improve water retention and to reduce erosion ('bio-engineering').

During the devastating Koshi floods in 2008 that displaced more than 70,000 people in Sunsari District in the Terai, many houses near bamboos groves were less damaged. These houses were some of the few standing structures after months of inundation, with most other buildings washed away. This demonstrates the value of bio-engineering but such schemes will need to be hugely expanded in the light of climate change.

"My project supports water supply and sanitation in six VDCs in Baitadi. We have noticed the discharge rate in water sources is decreasing over the years. We are planting (vegetation) in and around water sources to protect them from drying out".

Padam Bista, Water Resources Advisor,
FINNIDA Rural Village Water Resource Management
Project, Baitadi District

Building a biological wall; Arjun dhara revives after bio engineering works

Arjun dhara Village Development Committee lies along a bank of the Birangee River in Jhapa District. Approximately 150 households reside along the bank. It is one of the VDCs worst affected by flooding.

"In 2042 BS (1985), a big flood hit the VDC. It damaged 13 households including mine. My two storied concrete home was washed away by the flood. Nothing was left. We took shelter in a relatives house for a few days and then migrated to the city. We stayed in a rented room and started small business. Business is flourishing and now we live in our own home" said Kedar Nath Parajuli, Arjun dhara Village Development Committee, Jhapa District.

"Ten years after, I come back to the same place. The situation had not changed. Every year floods cut (erode) lands and displace many families. I took 200 people to Madhumalla VDC, in an adjoining district where bio-engineering work to check floods has already been initiated. In 2058 (2001), we started bio-engineering works with support from a few families. We prohibit cattle grazing in a zone extending 500m along the riverbank and we planted bamboos and grasses. Bamboo flourishes in sandy soil and grasses started growing. Next year we planted more grasses along the riverbank. Grasses reduce the river current and protect the bank from erosion. We became enthusiastic. We started planting trees. Now the riverbank is no longer sandy, it is full of greenery. It acts as a biological wall that protects us from floods. There are many other additional benefits as well. The river has not dried out because of the greenery. In summer, the area is cooler relative to other places. Grasses are readily available all season (for fodder). But we do not allow uprooting of grasses. Many birds are seen in the areas. The VDC has completely changes since bio-engineering works for us".

Government Actions on Climate Change

The Government of Nepal (GoN) is moving forward on climate change, and has recently begun a donor-funded process that will see the creation of a platform of information, data and studies on climate change, a regional consultation on climate change and the creation of a National Adaptation Programme of Action (NAPA). Nepal is one of the last signatory countries to the United Nations Framework Convention on Climate Change (UNFCCC) to complete the NAPA process. Donor support is significant with the UK Department for International Development (DFID), the Danish Department for International Development (DANIDA) and the UNDP/Global Environment Fund (GEF) involved.

Actions on climate change adaptation and mitigation are hampered by a lack of technical capacity and weak coordination across the government and low awareness and prioritisation of climate change at all levels. Many key ministries such as the Ministry of Agriculture and Co-operatives and the Ministry of Water Resources and associated Departments are unaware of the implications of climate change and are implementing only a very few, nascent activities. The Ministry of Environment (MoE) is the lead agency for climate change but needs improved resourcing that, to some extent, is been addressed by the NAPA process. The GoN's participation in international negotiations has been erratic and there is little coordination with other governments in the region, despite the critical need to coordinate on water and energy resource management. At the district level key government staff are often not aware of climate change and the predicted impacts on agriculture, disasters and poor people despite the critical role they would play in supporting adaptation.

Institutionalising climate change approaches within key ministries (such as the National Planning Commission, Ministry of Finance, Ministry of Local Development, Ministry of Water Resources, Ministry of Agriculture and Cooperatives, Ministry of Health and Population etc.) is a major challenge. Recently the MoE has formed a separate cell to address climate change and oversee the NAPA process. It has also led the formation of a Climate Change Network (CCN)

comprising 22 member organisations, including various line ministries, departments and other agencies, INGOs and bilateral and multilateral development organisations. The network aims to conduct studies and research, promote Clean Development Mechanism projects, develop position papers for government reporting requirements under the UNFCCC, enhance the negotiation capacity of the GoN and identify areas of intervention on climate change. However, despite these bold objectives the network has yet to become active.

The nascent NAPA process is the most obvious vehicle for raising awareness and coordinating actions on climate change. However it is unlikely to result in complete financing for required interventions and the slow nature of the process is in stark contrast to the urgency required to address immediate adaptation needs. Besides the NAPA, the government is planning to establish a Knowledge Management and Learning Platform on Climate Change and develop a multi-stakeholder Framework of Action. The challenges are to make the process consultative and participatory, transparent, accountable and, most important, completed in a timely manner.

Other current initiatives include the drafting of a Climate Change Policy supported by the World Wildlife Fund (WWF) Nepal that is currently under review. The draft policy identifies Agriculture, Water Resources, Forest and Biodiversity and Human Health as the primarily impact sectors and emphasises the need to conduct further research/studies to quantify these impacts.

Other GoN initiatives include the National Capacity Self-Assessment (NCSA) for Global Environment Management. The NCSA was undertaken by the MoE with the support of UNDP/GEF. The objective of the NCSA is to catalyze national action to implement the Convention on Biological Diversity (CBD), United Nations Convention to Combat Desertification (UNCCD) and the UNFCCC. On the UNFCCC, it identifies climate change as a sustainable development issue and recommends institutional, technical and financial support to analyse the impacts and develop adaptation measures. Likewise the GoN has completed the first Communication Report as required by the

UNFCCC although the Second National Communication Report is long overdue.

In addition the MoE is undertaking several projects and programmes on capacity building and community adaptation with support from various bilateral and multilateral donors agencies. These include the 'Pilot Programme on Climate Resilience' supported by the World Bank, the 'Cool Earth Programme' supported by the Government of Japan and the 'Strengthening Climate Change and Environment Project' supported by the Asian Development Bank.

Other ministries are also implementing a range of separate initiatives. The Ministry of Forest and Soil Conservation (MoFSC) has formed a Climate Change and Reduced Emission from Deforestation and Forest Degradation cell comprising eight members from government agencies and national and international organisations. The MoFSC is implementing the 'Forest Carbon Partnership Facility' project with support from the World Bank. The project aims to build the capacity of the GoN to Reduce Emissions from Deforestation and (Forest) Degradation (REDD).

The Nepal Agriculture Research Council (NARC) is also developing stress-tolerant varieties of seeds, especially of wheat and paddy, and has conducted some research on the impact of rising temperatures on these crops. Development of improved seed varieties is an ongoing NARC activity that has potential for supporting community level adaptation.

The Department of Hydrology and Meteorology (DHM) is a key government institution. It has undertaken several studies on impacts of climate change on agriculture, Himalayan glaciers and freshwater. Technical expertise within the Department is available to strengthen and institutionalise climate change approaches within the plans and programmes of other ministries.

It is evident that there is a wide variety of initiatives taking place within the GoN. Coordination between line agencies and with other non-government stakeholders remains a challenge, as does coordination of the various support programmes of the wide range of interested bilateral and multilateral donors.

Other non-governmental initiatives

Mirroring the wide range of GoN initiatives is a wide range of activities by national and international non-governmental organisations (see Appendix Two for a Snapshot of Organisations Working on Climate Change in Nepal). These include a range of studies and community level projects that seek to further understand the impact of climate change from a community perspective. Many are integrating Climate Change Adaptation (CCA) into their existing programmes with DRR and Livelihood Support as the community level entry points. These activities offer much learning but are mostly been implemented on a pilot basis with unclear potential for nationwide scale-up.

Currently, WWF Nepal is implementing a Community Based Adaptation Programme in the Sagarmatha National Park (Everest region) and Langtang National Park. Similarly the International Centre for Integrated Mountain Development (ICIMOD) is working on sustainable agriculture and livelihood support in Hill and Mountain areas, and in collaboration with UNEP has conducted a study on the Impact of Climate Change on Himalayan Glaciers and Glacial Lakes in Nepal and Bhutan. Many international NGOs are actively working on DRR in Terai districts through a range of local partner NGOs. These include Oxfam Nepal (in Sunsari, Saptari, Mohattari, Rupendehi, Nawalparasi, Kapilbastu, Sindhuli and Rautahat districts), CARE Nepal, Practical Action Nepal, Lutheran World Federation, Action Aid, World Vision and the Save The Children Alliance.

Practical Action Nepal is undertaking an analysis of climate change scenarios and impacts with support from DFID in collaboration with Oxford University. Temperature, rainfall and other climatic parameters were studied and projections made for the years 2020, 2050 and 2100. The impact analysis covers a range of sectors such as agriculture and water resources. Practical Action Nepal is also implementing pilot community adaptation projects in Chitwan District and plans to expand to six other districts based on an analysis of climate extremes and geographical areas commissioned from the Society of Hydrologists and Meteorologists³⁹.

Several other organisations are implementing projects on carbon mitigation including the Biogas Support Programme jointly initiated by the Alternative Energy Promotion Center (AEPCC) with the support of SNV

Netherlands and the German KfW Bankengruppe. In addition other organisations are implementing micro hydropower projects such as the Rural Energy Development Project supported by UNDP and AEPCC. Biogas plants are already registered as a Clean Development Mechanism (CDM) project and in 2007 19,396 biogas plants were registered and have resulted in USD \$65,000 funding to AEPCC (a rate of USD \$7/tonne of the equivalent of CO₂ emissions substituted by biogas). The Promoting Renewable Energy, Energy Efficiency Green House Gases Abatement workshop in 2005 supported by the Asian Development Bank identified bio-gas, micro-hydro, battery powered transport (Safa-Tempo), electricity powered Trolley buses, household solar water heating systems and improved energy efficiency in industries as potential renewable energy projects.

With regard to awareness raising on climate change, many national and international Non-Government Organisations (NGOs) are actively involved at the community level, in schools and among the general public, including holding rallies, public meetings, interaction programmes etc. to mark World Environment Day, World Water Day and UNFCCC meetings. But these activities are isolated and uncoordinated.

Non-government, coordination and information sharing fora include the Climate Change Network Nepal (CCNN) that consists of 13 members including national and international NGOs, donor organisations (such as JICA and DFID) and UNDP. The Association of International NGOs has also formed a Climate Change Task Force chaired by the United Mission to Nepal and with the main INGOs involved in climate change as members. In addition, regional initiatives such as the Climate Action Network South Asia (CANSAs) is also increasingly active in campaigning and advocacy on climate change in the region and is linked to the global CAN International network that attends major UNFCCC meetings such as that in Copenhagen in December 2009. The role and strategy of each network is somewhat unclear, with poor linkages between them apart from overlapping membership. The country secretariat for the CANSAs network is still been decided but has the potential to link the Nepal based networks with global climate change advocacy networks. CAN International and CANSAs are supported by Oxfam International.

Conclusions

The international consensus is that global climate change is happening and Nepal is no exception. Indeed, Nepal appears to offer a particularly stark case. Scientists and experts have documented and predict continuing rising annual average temperatures that are exacerbated at higher altitudes. One consequence is the clearly documented phenomena of glacial retreat across the Himalayas that poses increased risk of catastrophic GLOFs but more importantly, forecasts a grim outlook for the millions of Nepalis and hundreds of millions of inhabitants of the major Asian river systems that rely on the seasonal melt-off of the Himalayan glaciers for much of their flows. Combined with increasingly unpredictable precipitation patterns in terms of form (rain, snow and hail), timing (early or late onset and continuity of the monsoon) and intensity (increasingly intense rainfall events), the outlook for rain-fed agriculture, access to water and occurrence of disasters (particularly floods, droughts and landslides) is alarming.

Oxfam's research on climate change in numerous countries including Uganda, Malawi, South Africa, Vietnam, Bangladesh, Russia, Haiti, Bolivia, nations in the Pacific⁴⁰ and now in Nepal highlights the role climate change will play in exacerbating poverty and inequality. The injustice is that the people of Nepal and many of these countries are suffering the consequences of a situation that they have the least resources to cope with and bear little responsibility for creating. Nepal is one of the 100 countries most affected by climate change, yet it has one of the lowest emissions in the world- just 0.025% of Greenhouse Gas Emissions⁴¹. In general the poorest are the most exposed to the predicted impacts of climate change, have the least resources to cope or adapt and are the least informed. In Nepal 31% of the population is estimated to be living below the poverty line and most of these live in rural areas and are engaged in subsistence agriculture. Poverty is closely linked to social exclusion in terms of caste, ethnicity and gender with the Hill and Mountain ecological zones and the Mid and Far Western Development Regions containing the highest incidence of poverty.

Oxfam spoke to people in fourteen rural communities in the three ecological zones, including local

authorities. The results were remarkably consistent with the current climate change projections but at a level that climate science is unlikely to achieve. People spoke of:-

- Warmer, drier winters with declining snow and increasing rain resulting in reduced soil moisture content and reduced crop yields.
- More intense summer monsoon rainfall events resulting in increased occurrence of floods and landslides destroying land, crops and infrastructure.
- Increasingly unpredictable summer monsoon with early or delayed onset or periods of drought resulting in lost crops or decreased yields.
- Increasing hailstorms resulting in destroyed crops.
- Declining water sources requiring people to travel further to collect water for consumption, domestic use and for livestock.
- More intense cold waves in the *Terai* plains.

The main impacts identified include:

- Declining crop production resulting in increasing and widespread food insecurity.
- Drastic declines in water resources, resulting in reduced crop yields but also increased workload for women and girls to collect water for daily use. Importantly people are also reported to be compromising their health by being forced to utilise unprotected sources.

Many of these observations are supported by an independent study undertaken in three ecological zones and in four different districts. Communities interviewed also spoke of changing seasons, drying up of water sources, increasingly unpredictable rains, increasingly intense hot days and increasing flooding resulting in increasing migration of men for seasonal work and a consequent increase in workload for women⁴².

Rain-fed agriculture is increasingly unable to meet the growing demand for food in rural areas. People are increasingly reliant on purchase of food in local markets to meet food deficits. This requires a source of income that for the poor is based around casual labour.

A longstanding source of income has been seasonal migration of men and boys to access labour opportunities in other districts, nearby towns and India as well as further abroad in other countries. However, increasingly the women, girls and boys that stay behind are also required to find sources of income on top of the arduous daily workload of making a home and farm function. Women are already on the front line of poverty and increasingly are also on the front line of climate change.

People are trying to adapt to the changing climate by growing new crops and improving water management but these examples are few in face of the vast numbers of families facing climate related hunger and uncertainty. Importantly the poorest, and women in particular, are the least able to adapt, lacking the resources to undertake new activities, the mobility and confidence to seek information and the time and energy to take on more hard labour.

Very little has been done by the government to support vulnerable families facing the brunt of climate change. Complex and uncoordinated climate change initiatives continue to progress slowly in Kathmandu

while increasing evidence of climate change related impacts as seen by the rural poor throughout the country continues to grow. The international and national Non-Government sector continues to document and pilot climate change adaptation measures throughout the country that are often based on DRR and rural development approaches, but at this stage these initiatives are yet to be systematically institutionalised in order to have greater impact.

Much discussion continues regarding the differentiation of ongoing poverty related impacts with those directly linked to climate change. The causes of impacts are complex. This discussion is likely to continue into the future and will be a key question for the NAPA process to address. However, it is clear that climate change related impacts are already exacerbating existing poverty and inequality and will continue to do so unless people can adapt. It is also clear that for the poor living in remote areas of rural Nepal this continued discussion, that may ultimately be impossible to resolve, will only delay interventions that could make a real difference to their lives and those of their children, right now. There really is no time to waste.

Recommendations

Rural people who contributed their valuable time and experience to this study need assistance of many kinds in order to adapt to climate change. This support must be designed to meet the needs and address the issues that particularly impact on marginalised groups, especially women, Dalits and *Janajatis* (ethnic minorities). Many of the proposed actions are consistent with ongoing and planned poverty reduction and development initiatives but it is important to see these through a 'climate change' lens. That is, events such as winter drought and intense rainfall events may no longer be 'exceptional events' requiring a short-term response but a sustained shift in weather patterns that requires a more long term and sustained adaptation strategy.

Short Term Actions

Immediate action to ease food shortages

The current widespread food shortages centred in the Hill and Mountain districts of the Mid and Far Western Development Regions must be addressed immediately. The response must be well coordinated between the relevant Government, UN (primarily WFP and FAO) and other non-state actors. Importantly, every effort must be made to ensure that the areas affected by recent drought are able to take advantage of the next planting seasons through improved access to required agricultural inputs combined with relevant training support designed to meet the needs of farmers, particularly women farmers. Food support should continue to target the most vulnerable families, and where possible Food and Cash for Work Programmes should target infrastructure works that will most contribute to agricultural productivity (such as access infrastructure, irrigation systems, water management structures etc.). Importantly, the above actions should be well coordinated and implemented within a long-term strategy for chronically food insecure areas that is based on the climate change scenario of increasingly unreliable precipitation. This will require leadership from key line ministries such as the Ministry of Agriculture and Co-operatives as well as the Ministry of Home Affairs and Local Government.

Awareness raising on climate change

It is important to immediately ensure prioritisation of climate change within the GoN. This can be achieved through the development and enactment of mechanisms that ensure political commitment and increased coordination between government agencies as well as between government and non-state actors including NGOs, the private sector and the international community. A key priority is to ensure mutual understanding of climate change concepts and predicted impacts in order to move the discussion beyond the science to the human impacts at the community level. The recent convening of the High Level Council on Climate Change chaired by the Prime Minister is a welcome initiative provided that it leads to institutionalisation of climate change issues within the key line ministries both within the bureaucracies and at the operational level, particularly within local government. The NAPA process is an important vehicle to bring Government together, as well as the multitude of non-state actors and civil society in order to create a common understanding of the issues at hand and in order to coordinate actions and activities. This process must be consultative, inclusive and focus on those most vulnerable to climate change.

Importantly, increased efforts must be made to raise awareness at the community level, in order to change perceptions that local disasters such as drought and water shortages are not one-off events but rather - as many seem to be beginning to recognise - a sustained change that requires a sustained management approach. This in turn should be designed to combat perceptions that disasters are 'in the hands of God' in order to encourage the adoption of DRR approaches that are informed by predicted climate change impacts and include climate change adaptation measures. It is essential that communities are supported to play a greater role themselves and take the initiative in climate change adaptation and DRR.

Institutionalisation of Disaster Risk Reduction (DRR) approaches

This is essential to reduce vulnerability to natural disasters that are predicted to increase as a result of climate change. There is a wealth of experience in implementing DRR approaches, primarily in the Terai region related to flood hazards. They include early warning systems, community and local government preparedness and response planning and training, awareness raising, small-scale mitigation works etc. These have largely been driven by the NGO community, donors and local government with the support of the Ministry of Home Affairs. Successful initiatives must be institutionalised into Government policy as a whole (including financing, planning as well as technical support) in order to shift the emphasis from response to DRR. An essential first step would be enactment of a revised Disaster Management Act, and then through the implementation of the appropriate policy and strategies (currently in draft form). Importantly, current DRR approaches must be expanded nationally to incorporate climate change-related scenarios including not only the more obvious related hazards such as GLOFs but also the less obvious related hazards, such as localised drought, floods, landslides, outbreaks of disease etc. that are already occurring but are likely to increase under the various climate change scenarios. Increased emphasis on water resource management, particularly in the Hill and Mountain regions, will be an important DRR approach that should include increased storage and harvesting of rainwater, development of water-saving irrigation systems and improved catchment management incorporating biological and physical water retention structures.

Securing lives and livelihoods of vulnerable groups

All interventions should be designed to meet the specific needs of the most vulnerable groups, paying particular attention to the already excessive workload of women and girls, their limited mobility and education experience. Emphasis on labour saving technologies and attention to the development and use of appropriate information, education and communication materials will be required as well as increased deployment of field-based extension agents or social mobilisers. Agricultural and technological advisory support should be designed and

implemented according to the needs of the target groups. That will include informal education strategies, school-based extension strategies for children and design of training that ensures effective participation of the target groups. This will require a change in traditional agricultural extension strategies and the development of partnerships with non-state actors including the NGO and private sectors.

Long Term Actions

These should be built upon the short-term actions briefly summarised above.

Support for rural livelihood adaptation

The above short term measures to address food insecurity should be used as a basis to examine the future of current farming systems in the key vulnerable regions. This will require an analysis based upon the predicted climate changes in different ecological zones and the utilisation of Disaster Risk Reduction approaches. Likely strategies include the development of new cash and staple crop varieties that require less water or are drought resistant. This should be combined with farming system approaches that reduce weather related risk through improved water management, more diversified cropping strategies, improved market linkages, increased integration of livestock rearing, management of local natural resources (particularly forests and water) and the development of community insurance schemes for key assets (such as crops and livestock). This process should be farmer-based and built around improved extension services and capacity strengthening of key target community members recognising that men, women and children all play an important role in household food security. Improved access to information is a key strategy, both in terms of agricultural and livestock extension but also in terms of weather forecasting with meteorological stations playing a more supportive role to the farming community.

Incorporation of Climate Change into national level planning

This will require each line agency and policy makers to actively identify and plan for climate change related scenarios and hazards in addition to ongoing DRR

approaches. This includes improved land use planning focusing on improved management of sensitive areas such as catchments and areas prone to disasters. This will also include the development of scenarios and contingencies to address glacial retreat and the long-term impact on river flows. This will include programmes to mitigate the risk of GLOFs, the impact of reduced river flows on hydropower facilities and irrigation systems as well as the impact on communities residing along these river systems. Review of existing plans and policies in key sectors such as agriculture, water resources, disaster management etc. will be required. The current NAPA process should be utilised as a catalyst to develop a Climate Change Policy and Strategy with the active participation of Government and non-Government actors as well as a process to develop a national adaptation plan for funding. The donor community should ensure that their support for NAPA and climate change is well harmonised, sustained and extends beyond consultant reports to actions that make a difference on the ground.

Improved international advocacy

The impacts of climate change will be felt well beyond the borders of Nepal particularly in those countries

that rely directly on the snow and ice of the Himalayas to feed the river systems that many of their populations rely upon. This particularly applies to the countries that straddle the Himalayan range including much of inland China, Central and South Asia and the mainland of Southeast Asia. Nepal should engage in diplomatic discussions with these countries to form a bloc or grouping similar to the Alliance of Small Island States (AOSIS) to call for ambitious emission reduction targets and substantial support (financing and technological) for adaptation to be agreed in the international climate negotiations in Copenhagen in December 2009 and in other relevant fora. This 'Alliance of Himalayan Countries' (or the like) would be a powerful global advocacy tool particularly when combined with other groupings such as AOSIS. In addition, it is important for Nepal to work with India and Bangladesh to ensure a River Basin Approach that addresses management of their common river systems particularly in light of predicted climate change impacts. This approach should ensure that development projects along the common river systems are planned, reviewed and managed to minimise negative impacts on all riverine communities and that water management is made more equitable, effective and sustainable.

Appendices

Appendix One: Persons Met

S.No.	Name	Position	Organisation
1	Battu Krishna Uprety	Under-Secretary	Ministry of Environment and Technology
2	Dr. Jagadish Baral	Officer	Ministry of Forest and Soil Conservation
3	Saraju Kumar Baidhya	Senior Divisional Meteorologist	Department of Hydrology and Meteorology
4	Shreekamal Dwivedi	Engineering Geologist	Department of Water Induced Disaster Management, Ministry of Water Resources
5	Dr. Krishna Bhakta Manandhar	Senior Meteorologist	Weather Forecasting Division, Department of Hydrology and Meteorology
6	Dr. Madhusudan Ghale	Division Chief	Horticulture Research Division, Nepal Agriculture Research Centre, Ministry of Agriculture and Cooperatives
7	Bikram Bahadur Chand	Programme officer	District Development Committee, Baitadi District
8	Tek Singh Kohali and Dhan Bahadur Khadka	Officer	District Agriculture Office, Baitadi District
9	Dil Bahadur Sahi and Shree Krishna Bhatta	District Health Officer and Officer	District Health Office, Dadeldhura District
10	Yagya Raj Bhatta	Programme Officer	District Development Committee, Dadeldhura District
11	Lekh Nath Adhikary	Officer	District Agriculture Office, Dadeldhura District
12	Yagya Prashad Bhattaria	Local Development Officer	District Development Office, Surkhet District
13	Lila Ram Poudel	District Agriculture Officer	District Agriculture Office, Surkhet District
14	Hari Lal Giri	District Soil Conservation Officer	District Soil Conservation Office, Surkhet District
15	Digambar Mishra	Senior Technician	Meteorological Station, Dadeldhura District
16	Padam Bista	Water Resources Advisor	Rural Village Water Resources Management Project- Baitadi District
17	Clare Shakya	Sr Regional Environment and Water Adviser	Department for International Development Nepal (DFID Nepal)
18	Gehendra Bahadur Gurung		Practical Action Nepal
19	Moon Shrestha	Climate Change Officer	World Wildlife Fund-Nepal
20	Raju Chettri	Coordinator	AIN CC Task Force, United Mission to Nepal

S.No.	Name	Position	Organisation
21	Suresh Bhattaria	Disaster Management Advisor	United Mission to Nepal
22	Bibek Chapagain	Acting Director	Winrock International -Nepal
23	Khagendra Nath Khanal	Assistant Director	Biogas Support Programme -Nepal
24	Nahakul Thapa	National Coordinator DRR Through Schools Programme	ActionAid Nepal
25	Manjeet Dhakal	Programme Manager	Clean Energy Nepal
26	Dr. Narayan Chaulagain	Executive Director	People, Energy and Environment Development Association (PEEDA)

Appendix Two: Snapshot of Organisations Working on Climate Change in Nepal

S. No.	Organisations	Projects/Programmes	Geographical Areas	Sector Covered	Status
1	Practical Action Nepal	Increasing community resilience to cope with impacts of climate change	Jugedi VDC, Chitwan District	DRR and Livelihood Support	Ongoing
		A Study: Identifying the Climatic Extremities and the Geographical Area		Research	Completed
		A Study: Community Perception, Impacts and Adaptation to Climate Change	Rasuwa, Dhading, Nawalparasi, Kailali, Jumla Kalikot/Accham	Research	Completed
		A Study: Climate Change Scenario Analysis and Impact Analysis	National	Research	Ongoing
		Participatory Climate Change Survey	Rasuwa, Dhading, Nawalparasi, Rupendehi, Kailali, Jumla, Doti, Salyan, Kaski, Lamjung, Dolakha, Sankhuwasabha and Makwanpur	Research	Completed
2.	World Wildlife Fund Nepal	Reducing poverty in Nepal, through innovative and equitable carbon financing mechanism (REDD)		Research	Ongoing
		Climate for Life Campaign	National	Campaign and Advocacy	Ongoing
		Climate Change Policy	National	Policy	Ongoing
		Implementing Climate Change Adaptation in Nepal	Langtang National Park	Multi-sectoral	Ongoing
		Monitoring the glaciers of the Himalayas	Everest Region	Climate Change Scenario analysis	Ongoing

S. No.	Organisations	Projects/Programmes	Geographical Areas	Sector Covered	Status
3	United Mission to Nepal	DRR and Response	Sunsari, Rupendehi, Nawalparasi	DRR	Ongoing
		Regional Consultation on Climate Change Policy	National	Advocacy	Ongoing
4	CARE Nepal	A Study: Climate Change Impacts on Livelihoods of Poor and Vulnerable Communities and Biodiversity Conservation	Banke, Bardiya, Dhading and Rasuwa districts	Research	Completed
5	Action Aid Nepal	A Study: Child Voices: Children of Nepal Speak Out on Climate Change Adaptation	Banke and Rasuwa	Research	Completed
		Disaster Risk Reduction through School Project. Climate Change as a cross-cutting theme	Various	DRR	Ongoing
6	Li-BIRD	Agriculture Innovation and Livelihoods Support Climate Change as a cross-cutting theme	Various	Agriculture	Ongoing
		Biodiversity for Sustainable Livelihoods Climate Change as a cross-cutting theme		Biodiversity	Ongoing
7	Clean Energy Nepal	Strive for Climate Change Awareness and Action		Awareness	Completed
		Youth in Changing Climate Change	Kathmandu	Awareness	Completed
		School level Climate Change Awareness programme	Kathmandu Valley	Awareness	Ongoing
		Pilot project for Awareness and Behavioural Change Communication/ Education – Phase I and II	Chitwan District	Awareness	Ongoing
8	Asian Development Bank	Strengthening Capacity for Managing Climate Change and the Environment (CADT)		Capacity Building	Ongoing

End Notes

- ¹ IPCC 2007: Summary for Policy Makers. In: Climate Change 2007: The Physical Science Basis. Contribution of Working Group I to the Fourth Assessment Report of the Intergovernmental Panel on Climate Change. Solomon, S. et al (eds), Cambridge University Press, Cambridge United Kingdom and New York, NY USA.
- ² OECD 2003: DEVELOPMENT AND CLIMATE CHANGE IN NEPAL: Focus on Water Resources and Hydropower'. COM/ENV/EPOC/DCD/DAC(2003)/FINAL
- ³ Government of Nepal 2008a: Nepal National Capacity Self-Assessment Report and Action Plan: National Capacity Self-Assessment for Global Environment Management, Ministry of Environment and Technology, UNDP and Global Environment Facility, December 2008.
- ⁴ WECS 2002: Water resources Strategy, Nepal, Government of Nepal Water and Energy Commission Secretariat (WECS) in Government of Nepal 2008b.
- ⁵ Economist 2007: Nepal Country Profile, The Economist Intelligence Unit, 2007
- ⁶ Government of Nepal 2008b: Nepal Stocktaking Report: Climate Change: National Capacity Self-Assessment for Global Environment Management, Ministry of Environment and Technology, UNDP and Global Environment Facility, December 2008.
- ⁷ United Nations Country Team Nepal, 2007: Common Country Assessment for Nepal 2007. Multiple sources cited within.
- ⁸ Nepal's Needs Analysis Framework, Inter-Agency Standing Committee, September 2008.
- ⁹ United Nations Office for Coordination of Humanitarian Affairs (OCHA) 2009, Nepal Humanitarian Transitional Appeal, OCHA Nepal.
- ¹⁰ Shrestha, A.B., C.P. Wake et al. 1999: Maximum Temperature Trends in the Himalaya and its Vicinity: An Analysis Based on Temperature Records from Nepal for the Period 1971-1994. Journal of Climate 12: 2775-2787. Cited in Government of Nepal 2008b.
- ¹¹ Baidya, S.K., et al. 2008: Trends in Daily Climatic Extremes of Temperature and Precipitation in Nepal, Journal of Hydrology and Meteorology, Vol. 5, No.1.
- ¹² Xu, J.C., Shrestha, A., Vaidya, R. Eriksson, M., and Hewitt, K. 2007. The Melting Himalayas – Regional Challenges and Local Impacts of Climate Change on Mountain Ecosystems and Livelihoods, ICIMOD Technical Paper, ICIMOD, Kathmandu.
- ¹³ Bajracharaya, S.R. et al. 2007: Impact of Climate Change on Himalayan Glaciers and Glacial Lakes: Case Studies on GLOF and Associated Hazards in Nepal and Bhutan. International Centre for Integrated Mountain Development (ICIMOD) and United Nations Environment Programme UNEP, Kathmandu, Nepal.
- ¹⁴ Shakya, N.M., 2003: Hydrological Change Assessment and Its Impact on Hydro Power Projects of Nepal, in draft proceedings of the Consultative Workshop on Climate Change Impacts and Adaptation Options in Nepal's Hydropower Sector with a Focus on Hydrological Regime Changes Including GLOF, Department of Hydrology and Meteorology and Asian Disaster Preparedness Centre, 5-6 March 2003, Kathmandu. Cited in OECD 2003.
- ¹⁵ OECD 2003
- ¹⁶ Xu, J. et al. 2007.
- ¹⁷ Government of Nepal 2008b
- ¹⁸ SOHAM-Nepal 2009: Report on Identifying the Climate Extremities and the Geographical Areas. Submitted to Practical Action Nepal. Society of Hydrologists and Meteorologists-Nepal.
- ¹⁹ Cruz, R. V., et al. 2007: Asia Climate Change 2007: Impacts, Adaptation and Vulnerability. Contribution of Working Group II to the Fourth Assessment Report of the Intergovernmental Panel on Climate Change. M.L. Parry, et al (eds), Cambridge University Press, Cambridge, United Kingdom 469-506.
- ²⁰ McSweeney, C., New, M. and Lizcano, G. 2008: UNDP Nepal Climate Change Country Profile, <http://country-profiles.geog.ox.ac.uk>
- ²¹ 2008/09 Winter Drought in Nepal, Crop and Food Security Assessment, Joint Assessment Report May 2009, Ministry of Agriculture and Co-operatives, World Food Programme and Food and Agriculture Organisation.

- ²² Regmi, B. R., Pandit, A., Pradhan, B., Kovats, S. and Lama, P 2006: Climate Change and Health Country report – Nepal, Capacity Strengthening in the Least Developed Countries (LDCs) for Adaptation to Climate Change (CLACC) Working Paper, Local Initiatives for Biodiversity, Research and Development (LI-BIRD), Ppkhara Nepal.
- ²³ Government of Nepal 2004: Nepal Initial National Communication to the Conference of the Parties of the United Nations Framework Convention on Climate Change, Ministry of Health and Population (MoHP) and United Nations Environment Programme (UNEP), July 2004.
- ²⁴ Nagarik Dainik Newspaper, July 23rd 2009: Quote Ramesh Lamichane, Public Health Supervisor, Epidemiology and Disease Control Division, Ministry of Health and Population, and Ram Bahadur Chand, Health Worker Jajarkot District and <http://www.un.org.np/resources/diarrhoea-outbreak>
- ²⁵ Kantiput Daily 25th March 2009: Nepal: 60pc of Water Sources Have Dried. Study Paints Grim Water Picture of Dadeldhura.
- ²⁶ OECD 2003
- ²⁷ Asia Society 2009: Asia's Next Challenge: Securing the Region's Water Future. A Report by the Leadership Group on Water Security in Asia, April 2009.
- ²⁸ Xu, J. et al. 2007.
- ²⁹ IASC 2008: Nepal Needs Analysis Framework, Key Findings, Inter Agency Standing Committee (IASC) September 2008.
- ³⁰ United Nations Country Team Nepal, 2007
- ³¹ Wily, L.A., et. al (2008). 'Land Reform in Nepal- Where is it coming from and where is it going?' The Findings of a Scoping Study on Land Reform, DFID Nepal, Kathmandu
- ³² WFP 2009: 2008/09 Winter Drought in Nepal, Crop and Food Security Assessment, Joint Assessment Report May 2009. Ministry of Agriculture and Co-operatives (MoAC), World Food Programme (WFP) and the Food and Agriculture Organisation of the United Nations (FAO)
- ³³ WFP 2008: Passage to India, Migration as a Coping Strategy in Times of Crisis in Nepal, Implications for WFP Responses, World Food Programme (WFP), Nepal Development Research Institute NDRI), December 2008.
- ³⁴ The Kathmandu Post Daily, May 8, 2009: 'Stress tolerant seeds cure for climate change', Ananda Kumar Gautam, Nepal Agriculture Research Council (NARC).
- ³⁵ Personal comments, Krishna Bhakta Manandhar, Senior Meteorologist and consultant, Weather Forecasting Division, Department of Hydrology and Meteorology, Kathmandu Airport.
- ³⁶ Baidya, S.K., et al. 2008
- ³⁷ Jennings, S. and Magrath, J. 2009: What Happened to the Seasons? Seasonality Revisited, Perspectives on Seasonal Poverty, International Conference, Institute of Development Studies, UK, 8-10th July 2009.
- ³⁸ Personal comments, Dr. Madhusudan Ghale, Chief, Horticulture Research Division, Nepal Agriculture Research Council.
- ³⁹ SOHAM-Nepal 2009
- ⁴⁰ Oxfam 2008: Vietnam Climate Change, Adaptation and poor People
<http://www.oxfam.org/en/policy/winds-change-climate-poverty-malawi>
http://www.oxfam.org.uk/resources/policy/climate_change/poverty-environment-malawi.html
http://www.oxfam.org.uk/resources/policy/climate_change/uganda.html
http://www.oxfam.org.uk/resources/policy/climate_change/south_africa.html
http://www.oxfam.org.uk/resources/policy/climate_change/viet_nam_report08.html
http://www.oxfam.org.uk/resources/policy/climate_change/russia_climate_change.html
<http://www.oxfam.org.au/campaigns/climate-change/docs/The-future-is-here-final-report.pdf>
- ⁴¹ Government of Nepal 2008b
- ⁴² Sagun 2009, Climate Change Impacts on Livelihoods of Poor and Vulnerable Communities and Biodiversity Conservation: A Case Study in Banke, Bardia, Dhading and Rasuwa Districts of Nepal, Strengthened Actions for Governance in Utilization of Natural Resources (SAGUN) Program in Collaboration with Li Bird June 2009.



Cover Photo : Imja Glacier Lake, Solukhumbu

Credit : Govinda Joshi/ICIMOD Nepal

Imja Glacier Lake (5010m) is growing rapidly resulting from melting of the Imja Tsho Glacier, due to rise in temperature. The lake is at high risk of Glacier Lakes Outburst Flood (GLOF) threatening communities living below.



Country Programme Office, Nepal
Jawalakhel-20, Lalitpur
GPO Box 2500, Kathmandu
Tel : +977-1-5530574/ 5542881
Fax : +977-1-5523197
E-mail : oxnepal@oxfam.org.uk