

In Nepal 3.7 million people are currently food insecure and each year an average of 1,000 are killed in natural disasters. In the south of the country 100,000 displaced flood victims returned home this year, while in the north tens of thousands left their infertile land to find work abroad. During the past 18 months the price of staple commodities has increased by up to 30 – 70 percent, and the government-owned oil corporation almost went bankrupt trying to maintain subsidized fuel costs. The nation is hundreds of thousands of tons food deficit following two of the worst winter droughts on record and a summer marred by late and erratic rainfall. In the capital city, power outages and water shortages are a daily occurrence. In Copenhagen this could be a scenario conjured by climate change futurists, in Kathmandu it is the situation in December 2009. The phenomena of severe drought, natural disaster, fluctuations in food production and poor access to energy sources are not new to Nepal; and for such reasons Nepal is considered a highly climate vulnerable nation. However, in recent years this vulnerability has been increasing due to a variety of environmental changes. The extent to which these changes are connected to global trends is not yet known. What is known – is that each year millions of Nepalese are forced to cope with increasingly severe climatic events through a variety of techniques – of which only a handful can be considered sustainable adaptation. This situation must reverse. In Nepal, research, planning and investment must focus on adaptation to a future of increased global warming working towards global goals for climate mitigation. These efforts can not, and should not be decoupled from efforts to support the people of Nepal who are already coping with increasingly severe climatic conditions.

A climate of change

Across much of Nepal the word for weather is the same as that for climate, and in the rural regions of the country where literacy rates are below 50 percent the term 'carbon dioxide' will leave most translators scratching their heads. Although the majority of rural Nepalese have never heard of global warming, if they are asked to identify changes which have undermined their ability to earn a livelihood from natural endowments such as air, land, water, vegetation, crops and livestock the evidence is startling. Rapid and visible "within one generation" changes to temperature, rainfall, agricultural production and prevalence of natural disasters are not only a stable topic of conversation, but to many a daily struggle.

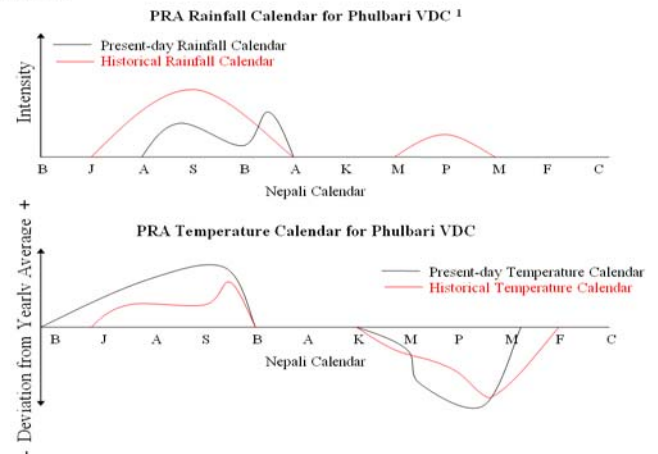
Through extensive interviews with local people a recent report by the *Institute for Social and Environmental Transition-Nepal* has highlighted some of these visible changes. For instance, in the hills and mountains farmers have noticed: increasingly erratic monsoon rainfall; reduced winter snow fall; increased landslides and bank cutting; and shortened flowering and fruiting period for some plants (including berries which now ripen in February instead of March or April)¹. Across the Terai farmers have reported that flooding events are becoming more frequent and more destructive as is frequency of crop loss caused by disease and insect infestation.

Focus group sessions conducted by the UN World Food Programme (WFP) with two Village Development Committees (VDCs) in Kailali and Humla, revealed dramatic alterations in the perceived frequency, intensity and timing of rainfall. Figure 1 provides a mapping of how villages view current rainfall and temperature patterns compared to what was once the normal trend.

¹ NCVST, 2009., Vulnerability Through The Eyes of the Vulnerable: Climate Change Induced Uncertainties and Nepal's Development Predicaments, *Institute for Social and Environmental Transition-Nepal*, Kathmandu Nepal.

Climate change data in Nepal is lacking; however, what data does exist provides some evidence to link the experiences of local people to national and global phenomena of rising temperature. The average temperature for Nepal as a whole is thought to have risen at a rate of 0.06° Celsius per year between 1968-2002²³. In addition, preliminary scientific analysis of rivers in Nepal has indicated an increase in the number of days of flooding and in some cases a decrease in dependable dry season flows⁴.

Figure 1.



² Mala, G., 2008. Climate Change and its impact on Nepalese Agriculture. *The Journal of Agriculture and Environment*, 9.

³ Shrestha, A. et al., 1999. Maximum Temperature Trends in the Himalaya and its Vicinity. *Journal of Climate*, (21), 2775-2787.

⁴ 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.



increased reliance on food markets. Ujeli Bista a village elder provides her insight:

"See up there [points towards top of village] when I was a girl we used to get snow there every year. These years there has been no snow fall in this village at all and each year the rain is coming less and less. "

"Our village used to have enough food for an entire year. If there was drought the village would share. Now no household has food for more than three months – so the men must migrate to India. With the money we buy rice in Surkhet and carry it back [a 19 day return trip]."

At the time that Ujeli was interviewed, the communities of Jumla were suffering from an additional set of climatic events – for three months severe landslides had blocked the Karnali Highway the only motorable transportation route to Jumla and indeed much of the Karnali region. As a result, household and market food stocks were very low. So despite possessing small amounts of cash, many communities in Ujeli's region were reliant on an emergency delivery of WFP and NFC rice to meet their needs because there was no food available in the markets.

To consider the full relationship between climate change, food production and livelihoods requires analysis of other important socio-economic changes. Perhaps the most important of these factors is population growth. As a final insight Ujeli explains the population growth of her village:

"This village used to have 25 households, 10 years ago there were 38 now there are 98."

Essentially this population growth has resulted in each household having 25 percent less crop land to support their family. In this case the impact of reduced yield due to reduced rainfall and reduced snow is exemplified by the higher number of people dependant on the smaller amount of land. Moreover, the population growth is increasing the impact upon the environment, therefore making such communities less resilient to future climate changes.

Predicting future agricultural losses due to environmental change is a difficult task. However, it is commonly expected that increasing drought, erratic monsoon, a rising snow line, crop disease, pests, and severe weather conditions will increasingly reduce crop production unless substantial interventions are made.

Climate change and natural disasters

Natural disasters not only damage crops, but also destroy livelihoods and block food transportation routes. In addition, across Nepal each year natural disasters will cause the loss of 1,000 lives, including 300 lives from flooding and landslides⁵. Climate scientists predict existing trends of increasingly more severe and frequent natural disaster in Nepal will continue - particularly more variable monsoon rains and more severe and frequent floods⁶. One recent study in Nepal has roughly estimated the current and future costs of re-current flooding to households in the Terai. The findings suggest that the annual

⁵ According to the Nepal Contingency Report 2008 by the Nepal Inter-Agency Standing Committee (IASC).

⁶ NCVST, 2009., Vulnerability Through The Eyes of the Vulnerable: Climate Change Induced Uncertainties and Nepal's Development Predicaments, *Institute for Social and Environmental Transition-Nepal*, Kathmadnu Nepal.

Climate change and agriculture

Nepal is labeled as one of the top ten countries most likely to be impacted by global climate change. This is due to its ranking as both one of the poorest countries in the world and its listing as one of the 20 most multi-hazard prone. In addition, 80 percent of Nepal's population rely on farming as their primary livelihood, but the majority barely produce enough food to feed themselves.

Over the past 30 years an increasingly capricious climate combined with 10 years of conflict, nearly 2 years of high sustained high food prices, ongoing security concerns and population growth has reduced the ability of Nepal's poorest households to depend upon their land to meet their basic needs. In response, out migration has significantly increased as a coping mechanism and Nepal has been regularly food deficit since the mid 1990s. This has caused a greater reliance on international employment, global food prices and global fuel prices (for food transportation) than ever before. Effectively this has globalised Nepal's food security. While this trend has provided visible wealth to the country (remittances now comprise 15 percent of GDP) it has been accompanied by hidden threats to sustainable living; in particular an increasing vulnerability to global climate change through reduced local production and increased reliance on climate volatile food markets and natural disaster prone transportation routes – particularly in the hills and mountains.

The impact of this was clearly demonstrated during the 2008/09 global food crisis when food prices in Nepal shot up by 20-40 percent. The crisis hit Nepal at a time when winter drought had reduced household production and the people of Nepal were more reliant than ever before on both local and international food markets which significantly heightened the impact of the food price increase on poor families.

A case study of Patamara VDC in Jumla describes the relationship between climate change, food production and

cost spread across all households could increase from a current estimate of NPRs 2,813 per year to NPRs 5,581 per year due to climate change⁷.

The increasing risk of Glacial Lake Outburst Floods (GLOFs) due to Himalayan warming is also of significant concern. These floods have enormous power and the potential to affect households and landholdings bordering extensive portions of the downstream system. Nepal has already had 15 GLOFs which provide some indication of the potential consequences if the risk is not averted. The most recent GLOF in 1985, when the Dig Tsho breached its bank, caused US\$ 40 million (NRs. 2,960 million⁸) in agricultural losses to Nepal.

Climate change and market prices

The increasing trend of national food deficits in Nepal due to climate change and other factors is making Nepal more reliant on international markets. However, these markets themselves are becoming increasingly volatile due to climate related factors.

It is commonly thought that global agricultural production will become increasingly volatile because of climate change related consequences such as increased drought, natural disasters, changing agricultural conditions, and land loss. A number of reports have suggested that if significant intervention is not made to adapt agricultural practices, then climate change could start to steadily reduce growth in global production within the next 10-20 years. This will have a significant effect on the quantity of food available for international trade and its trade price. In addition, international demand for bio-fuels is expected to significantly reduce the amount of food available for global consumption in the coming years. It has been estimated by the OECD that if proposed biofuel usage policies are adapted by the US and EU then the price of wheat and maize would likely increase globally by 10 percent and 14 percent respectively.

Nepal's national annual food price inflation already hovers around 16 percent which is adding significant burden to Nepal's poorest households who already spend more than 75 percent of their income on food. It is estimated by WFP that these sustained high prices have already pushed another 5 million people into poverty. Due to local and regional crop losses largely caused by natural disasters, WFP estimates that annual food price inflation in 2010 will remain at least as high as 10-15 percent in Nepal.

Reducing reliance on international food markets will need to be central to a national strategy of climate change adaptation. In a country where most of its people are subsistence farmers, improving the ability of households to adapt to climate changes by investing in agricultural assets will be critical.

The climate vulnerable

Those most at risk of climate change are the 31 percent of Nepal's population of 28 million who already live below the poverty line. The majority of these people live in rural areas with small land holdings and un-irrigated land. They are vulnerable to extreme weather events and often have poor access to information and resources to help them cope with and recover from weather-related disasters.

⁷ Ebit.
⁸ Based on today's exchange rates



Within Nepal people of minority caste groups typically have increased vulnerability to climatic shocks. For instance, many Janjatis who were once treated as bonded labourers, now occupy small landholdings located in environmentally vulnerable areas -typically along flood-prone river banks. Furthermore, during times of flood, they are often prevented from seeking refuge at the most accessible designated 'safe spots' as their presence is perceived to pollute the safer areas. Instead they are often forced to relocate to more vulnerable areas for shelter. Across Nepal Dalits also typically have very small land holdings and have traditionally survived as agricultural laborers. In the hills and mountains as this work has declined (due to increased population and lower rates of production caused by climate change) they face the harshest food security situation when crops fail.

Climate coping & adaptation

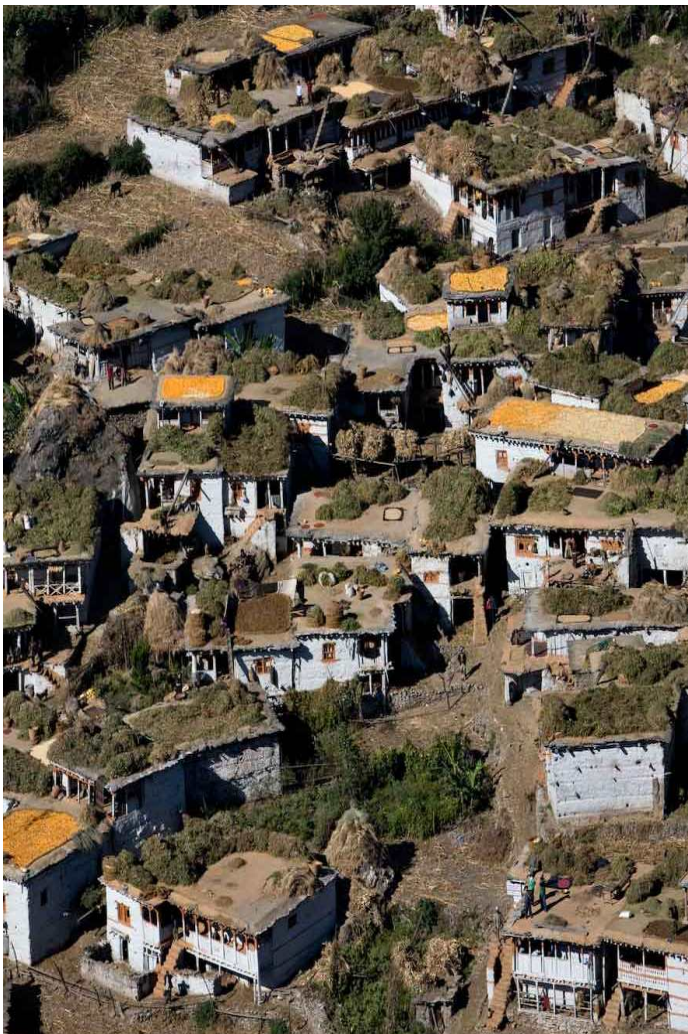
Across Nepal informal community-based climate adaptation practices are already undertaken. For example, subsistence farmers located in the Mid- to Far-Western regions have started to adjust their cropping calendar and many have coped with drought through increasing collection of local medicinal herbs. Communities in flood prone areas have been known to purchase boats and rebuild houses on stilts in preparation for future flooding.

However, Nepalese people face a number of barriers in their attempts to adapt to the changing environment they face. This includes a lack of financial assets, poor basic and agricultural infrastructure, and few opportunities for income diversification. Moreover, individuals are limited by a lack of information and awareness of the most effective ways to adapt. For the poorest communities, inequalities in access to financial, technological and information mean they are generally limited in their abilities to respond to environmental changes even though they are aware that they are occurring. Instead, they continually deal with the consequences through unsustainable coping mechanisms such as: selling household or agricultural assets,

consuming seed stock, taking larger and larger loans, reducing food consumption, and depletion of natural resources such as fire wood⁹. Ultimately, households and communities across much of Nepal are out-migrating for increasingly longer periods of time because they have exhausted all other methods of coping.

Sustainable communities - the future of food security

Across the hills and mountains of Nepal there is strong evidence that growing reliance upon a remittance economy, while increasing wealth, is not achieving sustainable food security. This is particularly so in the Mid to Far Western Hills and Mountains and Karnali regions. In the future farmers will face even greater agricultural stresses and it is perceivable that an unplanned wave of 'climate migration' could occur within the next 10 years. In some cases this migration may be necessary, particularly from chronically food deficit and highly isolated areas. From these regions a strategy of adaptation through permanent or long term seasonal migration may be appropriate. However, this should involve high level support to ensure appropriate city planning and a higher skilled migrant workforce.



Even the most fertile areas of the country (the districts of the Terai) face significant threats related to climate change. A concerning increase in the frequency and severity of flooding, pests and disease infestations are already causing agricultural losses.

Urgent investment to create sustainability in the livelihoods of agricultural reliant households (which represent 80 percent of the total population) needs to become the national climate change priority. Given the geographical and topographical diversity of Nepal, detailed national planning needs to be supported by regional or potentially even district level climate change impact evaluations linked to climate change adaptation strategies and investment. To build sustainable communities across Nepal, the following will need to be considered as key investment priorities:

- Institutionalisation of Disaster Risk Reduction, to minimize the future impact and likelihood of landslides, monsoon flooding and GLOFs;
- Institutionalisation of the Nepal Food Security Monitoring System within government as an early warning system to agricultural and food security changes;
- Renewed focus on family planning to ensure Nepal's rapidly growing population can be kept to sustainable levels;
- Development of a national river management strategy and appropriate funding committed to reduce the severity of anticipated future floods;
- Development of policies which support and encourage the development of sustainable energy such as hydro and wind power;
- Increased focus on education and skill development of young people in highly food-deficit and/or natural disaster prone areas to ensure their successful transition into urban life as part of a long term adaptation strategy.
- Increased scientific research into changing agricultural trends including agricultural patterns, increased pests, weeds and disease;
- Significant increase in agricultural investment across the country from 5 percent of government spending to at least 20 percent including micro-irrigation, flood and drought resistant seeds, fertilizers and other inputs; and
- Upscaling of successful climate resilient livelihood projects to diversify income in food-deficit areas, such as many of those currently undertaken by the government's Poverty Alleviation Fund.

This and other information products produced by WFP Nepal are available for download from the Nepal Food Security Monitoring System (NeKSAP) Google Group: <http://groups.google.com/group/NeKSAP?hl=en>

⁹ WFP household data.