

NGO Network Bulletin on

# climate CHANGE

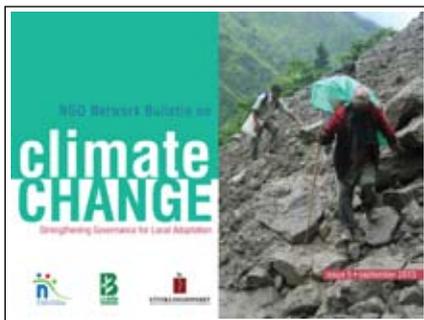
Strengthening Governance for Local Adaptation



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# IN THIS ISSUE



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- 1 Editorial
- 2 Exploring Challenges in Implementing Climate Change Adaptation in Nepal
- 8 Financing Climate Action in Nepal
- 14 Profit Over Planet: Accounting Available Finance in Climate Change
- 18 Climate Change Adaptation, Disaster Risk Reduction and Livelihood Based Social Protection
- 24 Millets: Adaptation Options for Smallholder Farmers to Climate Induced Stress Conditions
- 32 Climate Change Adaptation Practices Against Water Scarcity in High Mountain Areas
- 38 Impact of Climate Change on Forests
- 45 News and Events
- 54 Call for Article for The '6<sup>th</sup> Issue of 'NGONCC Bulletin'

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Changing climatic conditions are projected to affect significantly from the local to global level. The Earth's average surface temperature has risen by about 0.74 degrees Celsius in the past 100 years and it could even rise by up to 5 degrees Celsius by 2080 if the emissions of such gases are not decisively reduced, says the report of the Intergovernmental Panel on Climate Change (IPCC 2007).

For a number of years, there have been concerns that climate change negotiations will essentially ignore a key principle of climate change negotiation frameworks: the common but differentiated responsibilities. So far however, rich nations have done very little within the Kyoto protocol to reduce emissions by any meaningful amount, while they are all for negotiating a follow up treaty that brings more pressure to developing countries to agree to emissions targets. In effect, the more delay there will be the more the poor nations will have to save the Earth with their sacrifices (and if it works, as history shows, the rich and powerful will find a way to rewrite history to claim they were the ones that saved the planet).

A mechanism suggested for tackling climate change and warming has been the idea of using Carbon Sinks to soak up carbon dioxide. To aid in this, reforestation, or planting of new forests, has been suggested. This is a popular strategy and nations have started to pilot Reducing Emission from Deforestation and Forest Degradation activities.

To address the issues of climate change, different government and non-government institutions have initiated adaptation programmes in Nepal. In NAPA

and LAPA, Nepal has prioritized the adaptation options and designed adaptation frameworks from national to local level. These national and local level initiatives have been endorsed by the Government of Nepal through the promulgation of the Climate Change Policy Nepal 2011. The policy has focused on an interdisciplinary approach wherein 80% of funds are allocated at the local level. However, it has been observed that there is a big gap between institutional arrangement, capacity for implementation and mechanisms for adaptation programmes at the local level.

In this context, we are publishing the fifth issue of the NGO Network Bulletin as a tool for sharing knowledge and information on climate change adaptation and mitigation, community-based adaptation, and the national and international scenario of climate change.

This 5th issue focuses on the challenges and issues that have been and will be encountered in the implementation of the adaptation strategy, from climate finance to its fund flow mechanism. The article 'Exploring challenges in implementing climate change adaptation in Nepal' gives an overview on the ground level reality of climate change and what the adaptation strategy demands in the Nepalese context. 'Financing climate action in Nepal' and 'Bailing out the planet' concentrate on questions related to institutions and resources. The institutional question is limited to the norms, practices and organizations that emerge primarily at the international and national level in response to climate change. The resource question deals with the capital that needs to be mobilized to mitigate climate change and

to finance the costs of adaptation to climate change in developing countries. 'Climate change adaptation, disaster risk reduction and livelihood based social protection' highlights issues related to proper policy formulation, social protection and climate change and the integration of these three components. 'Millets: Adaptation options for smallholder farmers to climate induced stress conditions' clarifies that climate change portends less rain, more heat, reduced water availability and increased malnutrition and that in such situation, if there is any cropping system that can withstand these challenges, survive and flourish, it is the millet system. 'Climate change adaptation practices against water scarcity in high mountain areas' provides an overview in regard to climate change, the likelihood that the future characteristics of climate will change in unknown ways and that the existing "best practices" should be viewed as providing a source of tactical short-term response to a changing environment as opposed to untested strategic long-term responses. Finally, the article 'Impacts of climate change on forests' describes the interrelation between climate change and forests, the ways in which climate change threatens the health of forests and the possible adaptation options available. At the end of this bulletin, some glimpse of NGO Network on Climate Change activities of 2012 are highlighted in News and Events sections.

We will be pleased to receive your feedbacks, which will be useful for enhancing the next issue.

Enjoy reading!

Editors

Bimal Raj Regmi

Photo: Krishna Lamal/LI-BIRD

# Exploring challenges in implementing climate change adaptation in Nepal

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## Introduction

Climate change is now a reality and humans need to adapt well to these expected changes and extremes. Adaptation is of more urgency and need in developing countries due to the degree of impacts on the resources and population (Ayers and Dodman 2010). However governance issues, such as institutional and financial mechanisms, capacity and knowledge on climate change, are challenging for the least developed countries who must effectively manage limited financial resources. There are several studies carried out by scholars and agencies highlighting governance, specifically the lack of policy coordination and synergy, as an obstacle to upscaling and institutionalization of the climate change agenda (IDS 2007; Ayers 2009; OECD 2009; Ayers, Alam et al. 2010; Oxfam 2011).

As climate change work is progressing in Nepal in terms of policies and plans, there are fundamental issues around putting climate change adaptation into action. The current assumption that the existing system of governance will work may in fact lead to a failure. It is therefore necessary to diagnose the existing scenarios that might create impediments to the successful implementation of adaptation priorities. This paper diagnoses the challenges of dealing with climate change adaptation in Nepal's context. The analysis provides suggestions for overcoming the barriers to implementing climate change adaptation.

The information presented in this paper is based on literature review, informal consultation with relevant stakeholders at national and local levels and reflections based on the author's experiences in the field.

## Issues around operationalizing climate change adaptation

### a. Climate change science and knowledge:

The science and knowledge on climate change, particularly the national context and future scenario, are blurred in the case of Nepal. There are multiple reasons why the science and knowledge on climate change is not so developed in Nepal. Research and knowledge documentation are weak (NCVST 2009). Similarly, there are issues regarding sharing and practices of handover of knowledge from one generation to another and between and among individuals and institutions. The research and academic institutions have not yet internalized climate change issues within their portfolios due to various reasons. There is no single agency which is responsible for carrying out climate change research.

Academic institutions are also not very engaged in climate change issues. Although there are recent attempts to revise the curriculum to adjust to climate change, this is only limited to academic reading

*The research and academic institutions have not yet internalized climate change issues within their portfolios due to various reasons.*

and preliminary science. The research component is entirely missing. International organizations and civil society institutions have done some research and knowledge generation with support from donors and development agencies but again this has been limited, scattered and very general. Much of the information and knowledge on climate change in literature and articles published is repeated many times over.

In important sectors such as in forestry, agriculture, health and water resources, we do not know how severe the climate change impact will be. There is lack of information on how climate change is affecting farming systems, cropping patterns, crop composition, productivity and biodiversity. We find general statements saying that climate change related droughts and extreme weather result in low production and loss of species, but we do not know how much of the crop yield is declining by the extremity of conditions brought on by climate change. Similarly, we cannot say which species are emerging or being lost due to climate change. In the forestry sector, the information and knowledge is very weak. There is no convincing example of how forest resources are impacted by climate change. The information gap also exists in water resource and health sectors where it is difficult to predict how and on what scale climate change will impact these sectors.

The most challenging part of climate change science and knowledge is around future projections and particularly on downscaling the information to the

local level so that it can support decision-making. In countries like Nepal, where there are less resources and systems of documentation and projection, it is challenging to come up with solid and precise scientific projections on climate change. Any policy maker or decision-maker should be equipped with knowledge on what might happen due to climate change in 5, 10 or 15 years time in order to devise flexible policies and actions to respond.

**b) Policy and political context :** The political context of Nepal is very fragile and uncertain. The recent political failure to draft new a constitution is worrisome for dealing with climate change issues (Regmi and Bhandari 2012). Dealing with climate change requires national consensus and a favorable political environment. Although our political parties might be in favor of the climate change agenda, there is lack of political appetite and interest in this agenda for various reasons. One is that political parties are struggling for gaining power and have yet to resolve the future political roadmap of the country. Similarly, in most of the parties' portfolios there are agendas like development, economic prosperity and social transformation. If climate change is not a political priority, resource allocation and political commitment for implementation are not guaranteed.

An important aspect is the policy context. There seems to be a very positive policy environment in terms of promoting climate change adaptation in Nepal. Nepal has a climate change policy, a National Adaptation Programme of Action (NAPA) and a Local

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*Capacity development projects on climate change are limited to a few individuals and institutions and are mostly centralized.*

Adaptation Plan of Action (LAPA). Despite these progressive policies, sectoral policy responses are not that encouraging as they do not even mention climate change. It is unrealistic to assume that sectoral policies will make climate change a priority in absence of their sectoral policies and strategies. Similarly, there are isolated policies and programmes that could hinder climate change mainstreaming as climate change demands cross sectoral integration and synergy.

**c) Capacity and human resources:** Climate change is a problem with a high degree of uncertainties. We need country specific and local specific capacities to deal with this uncomfortable knowledge and reality (Moench 2010). The current capacity within country in terms of climate change is negligible. Nepal has not been able to produce skilled human resources in the climate change field. This is happening because climate change is not a priority for human resource development or in the country's strategic goals and priorities as described in past development plans. Mostly the country has to rely on external experts for preparation of policies and strategic plans. The current research and academic institutions also lack knowledgeable person in climate change. What we have is a group of individuals and professionals who are interested in this agenda and who have mostly switched their profession from other sectors. Due to lack of the required capacity, our discussions and interactions at national level are very generic in issues and depth of discussion. This suggests that we need to have a national and local level capacity development plan in order to address the capacity gaps. Similarly, this

plan has to be supported with strong policies, political support and sustainable financing.

It is important to have capacity at all levels ranging from policy makers, practitioners, implementers and recipients. There is a dearth of expertise within our government and public sector to deal with climate change issues. There are hardly any specialists or experts in the climate change area within our government ministries and departments. Capacity development projects on climate change are limited to a few individuals and institutions and are mostly centralized. There is a very limited intervention at the local and community level.

There is a danger that climate change adaptation responses might be diluted and fragmented due to lack of knowledge and capacity. Many think that adaptation activities are similar to development activities, so carrying out development activities will address climate change risk and impact. This general way of thinking might lead to failure of climate change responses. It is true that good development practices will address risk and vulnerability but it is important to appreciate that not all development activities are pro-adaptation. There is also an intrusion of new and complex development jargon within climate change field. The recent ones are: green development, low carbon development path, climate resilient development. Although it may sound good and fancy, this really confuses and even undermines the urgency of adaptation. It might divert attention

and resources into other areas based on the interests of specific agencies and institutions.

**d) Implementation challenges:** There will be challenges to implement climate change adaptation responses both at the local as well as the national level. The challenges are related to issues discussed above such as lack of information and knowledge, capacity and governance barriers. Besides this, there are issues like technology and financial resources which will govern the success or failure of adaptation.

The technology and practices for adaptation are not seriously considered in climate change adaptation debates, both at international as well as national levels. There is also an assumption among adaptation practitioners that climate change adaptation can be easily implemented using development models, development approaches and development technologies. However, not all development technologies will address climate risk and extremes (Klein 2005). Those development technologies that rely heavily on short-term development gains, e.g., infrastructure development and commercialization of agriculture, may lead to mal-adaptation if environment factors are not taken into consideration. We have experienced challenges and even failures in our development models. It is therefore necessary to understand this importance of practices and technologies that can address the complex issues of climate change (Ayers and Dodman 2010). There is also danger of adopting a blanket approach to adaptation. For example, many of the same

development practices are continued in the name of adaptation. Such approaches may or may not work as the uncertainties of climate change demand innovations. It is necessary thus to focus more on research and innovations that can solve issues of information and knowledge gaps

Another important area to consider in implementing adaptation programmes is financial resources. Although the financial resource debate is very internationalized, it is relevant for countries to realistically map out the feasibility of current adaptation regimes in order to avoid over expectations. The current resources for adaptation allocated by international regimes (e.g. LDCF) is negligible compared to the requirement. Nepal is going to receive only USD 7 million (of the 300 million projected) for implementing a GLOF flood project. This projection is a tiny portion of the national demand for adaptation. Although there are questions about the calculation of the required resources within NAPA, it projects a situation in which we require millions of dollars in terms of investment.

## Conclusion and way forward

There is uncertainty associated with climate adaptation projections as it is very difficult to come up with actual projections on climate change impacts, associated impacts and the degree to which communities need to adjust and respond. These must be built on the experiences of communities

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*The role of local institutions and households is crucial in determining types of responses, while state and local government can facilitate and support local adaptation through resource flow and technological support.*

and households to deal with climate variability and extreme climatic events. As climate change is a serious problem it demands serious solutions.

Adaptation demands innovation and flexibility that can address the uncertainty and complexity of response measures. This means we have to identify the good institutional and financial mechanisms at the local level for facilitating adaptation which are governed by the government through a democratic and consultative process and participation of stakeholders. Solutions should be flexible, innovative and context specific. The role of local institutions and households is crucial in determining types of responses, while state and local government can facilitate and support local adaptation through resource flow and technological support. Civil society and government actors can provide technical support and facilitate communities to adapt.

The most important aspect of support should be based on local institutions and communities. We can start facilitating communities to exchange information and knowledge on climate change. We can promote successful practices and replicate institutional and financial modalities that have worked well. We need to mobilize local resources to make our practices more environment and climate friendly. This however implies that we change our mindset from argument to action, from self benefit to benefit of those in need, from blaming to doing, and most importantly from centrally focused operation to more grounded and localized operation.

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# Financing Climate Action in Nepal



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*A plan of operation for integrating climate change into the programmes of all the ministries is necessary and the office of the Prime Minister, being the chair of the Climate Change Council, should lead this.*

## Introduction

As one of the top ten vulnerable countries in the world, Nepal faces severe impacts of climate change. It has already been hit hard by extreme events such as erratic rainfall, distorted weather patterns, prolonged droughts, landslides and fast receding glaciers in the Himalayas. In this context, it is important to scale up funding to help poor people adapt to the impacts of climate change. The direct consequence of climate change is difficulty in the lives and livelihoods of people, especially poor and marginalized persons who already struggle to meet their basic needs.

In order to fight climate change, Nepal has been pledged over US\$350 million to support the poor and climate vulnerable communities in the past few years. Moreover, one study entitled “The Future for Climate Finance in Nepal,” conducted by Overseas Development Institute for Nepal, states that nearly US\$700 million have been spent in one decade for financing climate change activities in the country. Climate finance is the support provided to poor communities to combat and reduce the impacts of climate change.

## Structural Issues

The Ministry of Science, Technology and the Environment (MoSTE) is the focal ministry in dealing with climate change at national and international

levels. It is playing a constructive role in terms of attracting donor funds and mainstreaming the climate issue as a national agenda in the country. However, this is not the sole ministry that is working to take the climate projects to the community. The Ministry of Federal Affairs and Local Development, the Ministry of Forest and Soil Conservation Affairs, and the Ministry of Health and Population are among those doing projects on the ground. MoSTE clearly lacks an implementation structure at the district and local level, which is a big setback for the ministry. However, as climate change is a cross-cutting issue that needs effective coordination and collaboration with line ministries and civil society organizations as well, MoSTE should forge greater collaboration and coordination.

There is also lack of clarity on how to bring the other relevant ministries under a single framework where these institutions perceive climate change as an issue dealt with by MoSTE. Climate change should be the priority of the government as a whole as tackling climate change is its responsibility. A plan of operation for integrating climate change into the programmes of all the ministries is necessary and the office of the Prime Minister, being the chair of the Climate Change Council, should lead this. All the relevant government agencies from the central to local level should be mobilized and civil society organizations should be engaged in formulating and implementing

programmes. Programmes that are on paper should be promptly taken into action.

An efficient fund disbursement mechanism and institutional arrangements (Climate Change Fund as stated in the national climate change policy) should be set up at different levels in order to guarantee the implementation of plans and programmes that reach the communities who are most in need. Representation of civil society organizations and participation of members of affected communities should be ensured in decision-making processes such as in multi-stakeholder committees at district and VDC levels.

## Policy Structure

In order to have political guidance and direction on climate change, a national council has been formed under the leadership of the Prime Minister. Similarly, a separate division has been created under MoSTE to facilitate the implementation of national policies and programmes. There is also an informal multi-stakeholder body called Multi-Stakeholder Climate Change Initiative Coordination Committee (MCCICC) that was created by the MoSTE for facilitating policy implementation. This committee seems not to be very responsive as limited meetings are held and meeting outcomes are not circulated widely.

The Government of Nepal approved a National

Climate Change Policy in January 2011 with a goal to improve the livelihoods of people by mitigating and adapting climate change impacts and adopting a low carbon development path (a development model that is climate friendly). The most urgent actions envisioned by the national policy to establish a climate centre and a national climate change trust fund have still not been implemented. This national policy is piling dust and awaits strong backing by all relevant stakeholders.

Implementation of this national climate change policy should be the priority of the government as a whole, not only of the MoSTE. Relevant agencies should approach donors with appropriate strategies developed to provide support to implement the goals listed in the policy. Presently, funds and programme priorities are based on donor interests and working areas.

## Programmes and Projects

In September 2010, the Government of Nepal with the initiation of the then Ministry of Environment (currently, Ministry of Science, Technology and Environment- MoSTE) formulated a National Adaptation Programme of Action (NAPA) to address urgent and immediate needs and concerns related to adaptation to the adverse effects of climate change. NAPA was highly popularized at the national level to be a solution document to climate change impacts

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and to support adaptation actions. However, now this document too has been left to gather dust as there is no sufficient fund to implement it and since donors have backed away from implementing the programme identified in the document. A similar approach was taken with the Local Adaptation Plan of Actions (LAPA) but communities still await its implementation. Other large-scale projects such as Pilot Project for Climate Resilience (USD 86 million), Up Scaling Renewable Energy Project (USD 40 million), Hariyo Ban (USD 30 million) etc. are in different stages of implementation.

Apart from these there are several small and medium size projects being implemented by many donors and non-governmental organizations, which are not accounted for at the national level. Coordination among these projects is lacking. Wider stakeholders and vulnerable communities are not very aware about these initiatives. Their participation in decision-making processes, identifying problems and implementation is almost non-existent. For instance, not enough consultations are held within PPCR projects with stakeholders and vulnerable communities. Any consultations done seem to be closed doors among the consultants and a small number of stakeholders while broader civil society engagement and community participation is yet to be realised.

## Unregulated Donor Interventions

As communities continue to be acutely affected by climate impacts and are in urgent need for immediate support, the delay in implementing climate change programmes is having severe consequences. While there is no question about enhanced efforts to access and lobby for increased international funding, the government must also hold the donors accountable to what their conditions are and how it is effecting the implementation of projects. Very clearly, donors have cut traditional development aid and diverted the aid money into climate finance. The government must ask donors to clarify whether their current funding is part of the existing official development assistance or additional climate finance.

In the backdrop of a weak and unstable government, donors have set a trend to spend the money favourable to their own conditions and priorities – some such projects are PPCR, Hariyo Ban and Nepal Climate Change Support Program. Often these projects have put government and non-governmental organisations at odds. The action points of the national climate change policy to establish a climate centre and climate change trust fund are still at stake due to donors' resistance to financing into the government agenda.

For effective mobilization and tracking of foreign aid, establishment of a climate change fund management institution is essential. The recent report of the UK based Overseas Development Institute states that over half of the money received for climate finance is spent on awareness raising and advocacy. There is also no guarantee that this money is not a part of regular development aid. Cutting back on aid will hamper in meeting the basic needs such as water, food security, educational and peace. Both the government and donors must be transparent about the sources of funds and how much is additional for climate change. Donors must clarify what is climate finance and what is regular development finance. For example, the Ministry of Finance setting up a separate budget code for climate change would be a good start. Channelling all climate finances for government projects through a single door mechanism like a climate change trust fund would make things smooth and transparent.

## Governance and Accountability

Limited resources or lack of funding is cited as the reason behind the obstacles to the implementation of many climate programmes and climate change policy.

It is a staggering reality that, despite millions of dollar in pledges, not enough financing has been channelled by developed countries as per their

commitment to support climate change work in Nepal. Even the meagre amount received in the country is taking time to get to the community level. Most of the funds seem to have been spent for preparing national documents and awareness raising activities. Local level institutions complain of not having resources to respond to the needs of vulnerable communities.

Many donor agencies are implementing climate change programmes in collaboration with NGOs. Donors have been providing support to organizations arbitrarily and later claiming it as climate finance. The national climate change policy envisions that 80% of the total climate funds must go to the communities but due to donors' resistance and lack of appropriate decentralised structures within the MoSTE and coordination mechanisms with other line ministries this has been difficult. It is important to find ways to strictly implement this.

The Government of Nepal has also been falling behind in accessing the funds at its disposal, which seems to be due to lack of human resources for producing projects and dealing with the implementing agencies. It has received about USD 10 million from the Least Developed Countries Fund out of the USD 15 million currently allocated to each of the LDCs. Many countries have also benefited by accessing funds from the Adaptation Fund but Nepal has not even put in

*Most of the funds seem to have been spent for preparing national documents and awareness raising activities.*

its proposal. The primary reasons for this its failure to accredit a National Implementing Entity (NIE) to the Adaptation Fund Board (AFB). Once the NIE is identified, this agency should deal with the AFB to develop and implement a project.

## Conclusions

Climate Finance is essential for helping the poor and climate vulnerable people of Nepal and some encouraging efforts have been made in that direction. However, a concerted effort is needed from all the relevant stakeholders for achieving higher success. The funds should go to the community as envisioned by the national policy. While it is crucial for the government to rectify its structural problems, donors should work with the government to solve the climate problem in the country. Likewise, the government should also start exploring in country financial resources (like taxes on fossil fuel, etc.) to implement its prioritized projects for climate change adaptation and to cut dependency on donors. The funds received and their flow must be transparent, and it is equally important to prioritise project implementation in participatory and inclusive manner. Some of the concrete steps to be taken forward would be to

- Implement the national climate change policy by developing a long-term climate change strategy to support programmes and projects.
- Map the existing financial resources within

the country and potential sources in order to implement programmes and projects that reach vulnerable communities, as envisioned by the national climate change policy.

- Create a clear institutional structure for the flow of climate finance within the government and also to develop a coordination mechanism with other relevant line ministries.
- Develop clarity on development and climate finance, on the part of both the government and donors.
- Conduct wider stakeholder consultations on current and future projects for information sharing, participation, transparency and accountability.

*The funds should go to the community as envisioned by the national policy. While it is crucial for the government to rectify its structural problems, donors should work with the government to solve the climate problem in the country.*



Sunil Acharya

Photo: LI-BIRD Photo Bank

# **Profit Over Planet: Accounting Available Finance in Climate Change**

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*As the climate talks are at a stalemate, developing countries are not getting the support they need and the cost of inaction is escalating. What does this mean for the future of humanity?*

Increased frequency and intensity of extreme weather events such as floods and droughts resulting from human induced climate change continue to haunt the planet. More specifically, communities in the least privileged parts of the world are finding it difficult to maintain their livelihoods because of increasing disasters. Economists have proposed a number of approaches to generating the finances required to mitigate global climate change, or to curb the emission of green house gases (GHGs) that cause climate change, and to help the poor countries adapt to its impacts. Although implementation of the proposed approaches hinges on the political commitment of developed and fast developing countries, the policy makers engaged in finding the solutions to combat global climate catastrophe are yet to reach consensus on mobilizing innovative sources of finance to that effect.

## Into the unknown territory

In the Copenhagen climate talks of 2009, the developed countries assured that they would provide scaled-up, additional, predictable and adequate funding, as well as improved access to developing countries. They committed themselves to a goal of jointly mobilizing USD 100 billion per year by 2020 to support developing countries for investing in clean energy technologies and for adapting to the adverse impacts of climate change. They also pledged to start

providing USD 30 billion in the period between 2010 and 2012 and to increase the amount every year to reach the long-term finance (LTF) goal of USD 100 billion per year after 2020. But the development since Copenhagen has been bleak. As the climate talks are at a stalemate, developing countries are not getting the support they need and the cost of inaction is escalating. What does this mean for the future of humanity?

Scientists engaged in climate change research predict that the planet is heading to more than a 4 degree Celsius of global temperature rise by the end of the century under the business as usual scenario. This will result in unimaginable consequences to the livelihoods of communities, displacement and loss of lives because of disasters, deterioration of human health and the collapse of the ecosystem of the planet as a whole.

## The climate finance requirement of developing countries

Avoiding dangerous climate change requires monetary investment apart from informed decision-making and planning. Developing countries require climate finance to strengthen climate resilience, curb green house gas emissions and accomplish sustainable development objectives. A number of studies have been conducted to assess the climate finance needs of developing countries. A report by

International Energy Agency estimates that USD 750 billion is required until 2030 and twice as much until 2050. Another assessment by an expert group on technology under the United Nations Framework Convention on Climate Change estimated that USD 300 to 1000 billion per year is needed in total (mitigation and adaptation) of which 182 to 505 billion is required for developing countries. Moreover, the same study estimated that adaptation needs of the developing countries amount to USD 27 to 66 billion a year whereas a World Bank study estimates the adaptation requirement of developing countries to be USD 75 to 100 billion.

## Proposed sources of climate finance

A wide variety of sources, public and private, bilateral and multilateral, including alternative sources, the scaling up of existing sources and increased private flows have been identified and proposed for LTF. Financial Transaction Taxes (FTT), also referred as Robin Hood taxes, in which a levy placed on a specific type of monetary transaction (e.g., securities transactions, bank transactions and currency exchange transactions) for a particular purpose, are being considered as a new and additional source. According to a report published by a high-level advisory group on climate financing set up by the UN Secretary General Ban Ki-moon, a tax rate of 0.001 to 0.01 percent on such transactions

translates into revenues of between USD 7 and 60 billion. The report also estimates that removal of GHG emitting fossil fuel (petroleum products) subsidies and redirection of fossil royalties can generate about USD 3-8 billion and 10 billion by 2020. Furthermore, directing budget contributions of 0.5-1% of the gross domestic product (GDP) of developed countries to long-term climate financing could correspond to between USD 200 and 400 billion.

Well-known American economist Jeffrey Sachs has calculated that a USD 4 per ton global carbon tax, if applied, would raise USD 250 billion. His further proposal that a tax rate of \$4 per ton for high-income, USD 2 per ton of upper-middle income, USD 1 per ton for lower-middle income, and USD 0 for low-income countries would achieve the global objective of USD 100 billion.

Some other significant sources include taxes on international transport (aviation and maritime), multilateral and bilateral development bank contributions and Assigned Amount Units emission trading schemes (AAU/Ets) introduced under the Kyoto Protocol. AAU/Ets would allow countries whose emissions are above their Kyoto target to purchase AAUs from countries that have a surplus in order to help them meet their reduction obligations.

*According to a report published by a high-level advisory group on climate financing set up by the UN Secretary General Ban Ki-moon, a tax rate of 0.001 to 0.01 percent on such transactions translates into revenues of between USD 7 and 60 billion.*

## So, why is there a stalemate?

The above mentioned figures clearly show that there are enough sources to meet the global financial requirement to support the most vulnerable communities and avoid dangerous climate change. So, a 'million dollar' question arises; why are the negotiators unable to strike a deal?

A number of explanations can be presented but all of them lead to a single conclusion: that the dominant world economic order puts **profit over planet**. The rich and powerful are busy accumulating wealth by exploiting natural resources and the poor at the same time. The policy makers are fenced in by the interests of those forces which comprise oil lobbies and the owners of industries based on fossil fuels. To mask this underlying fact, the developed countries and the fast developing countries are engaged in the blame game and at loggerheads on who should take action.

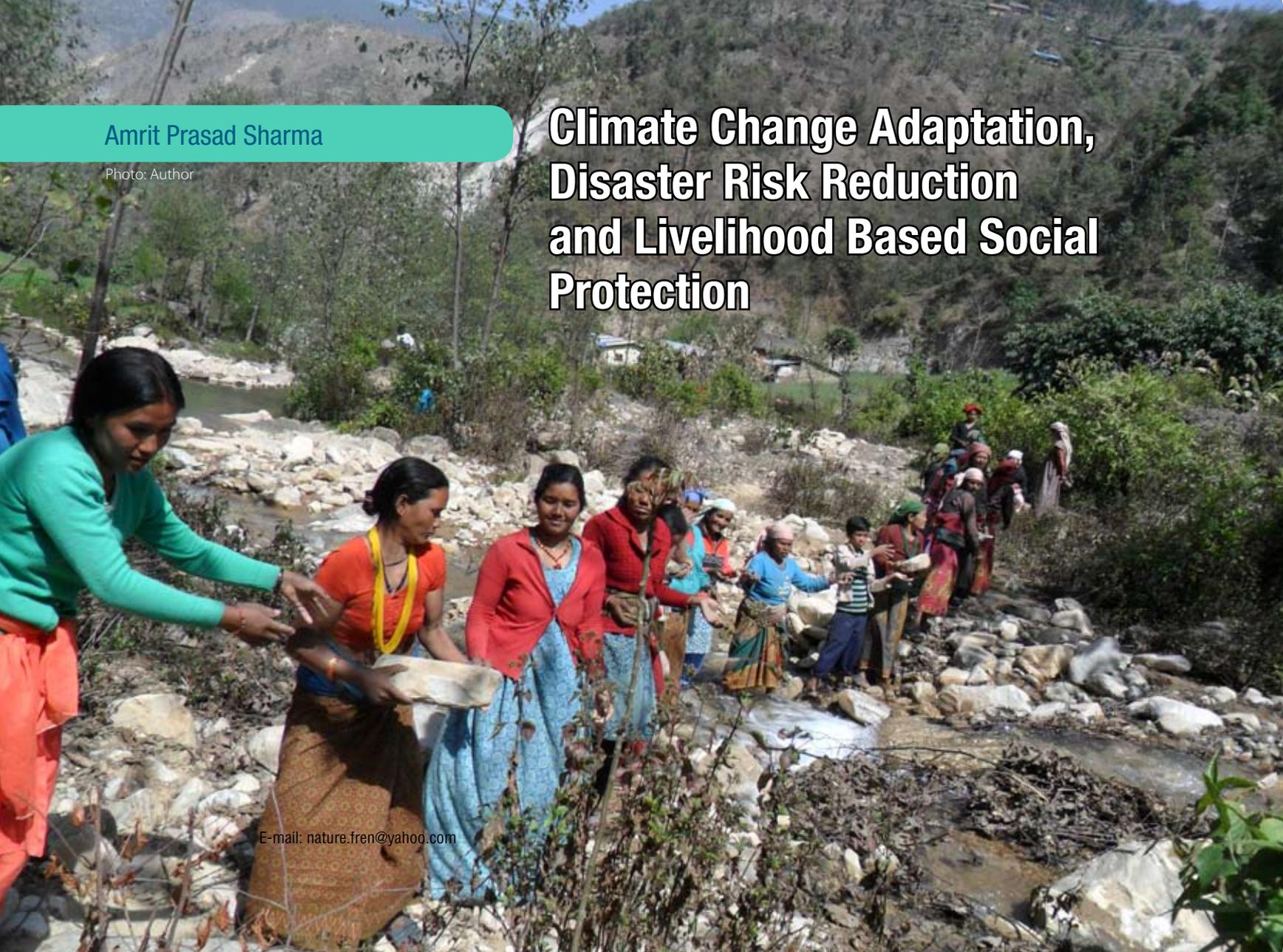
There is no option but that the developed countries take the lead, with emerging economies following the suit, to stop the climate crisis. To sum up in the words of Jeffery Sachs, in a world with a GDP of about USD 70 trillion per year and the climate finance requirement of just about 1/7 of 1 % of that amount, the costs to undertake mitigation and adaptation are far lower than the cost of Business-as-Usual.

*The policy makers are fenced in by the interests of those forces which comprise oil lobbies and the owners of industries based on fossil fuels.*

Amrit Prasad Sharma

Photo: Author

# Climate Change Adaptation, Disaster Risk Reduction and Livelihood Based Social Protection



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## Context

Climate change and natural disaster are the profound issues which alarm the government and threaten the population. The climate is changing and weather patterns are becoming increasingly extreme and unpredictable (IPCC 2007). The complexity of the physical and human systems and their interactions dictate that scientific models about future climate change impacts remain uncertain. Accordingly, the inability to predict the exact magnitude or timing of extreme climate-related events means that people must be prepared for the unexpected, whether related to the type or severity of the hazard or in the way in which the human system responds to it (CSDRM 2010). Though climate changes happen naturally, anthropogenic interference on the climate has accelerated environmental degradation, leading to climate changes that ultimately emerge as hazards and disasters. And, it is a fact that poor communities are mostly vulnerable to disaster.

Poorer developing countries like Nepal are especially vulnerable to climate change because of geographical exposure, low income and greater reliance on climate sensitive sectors. People exposed to multi-hazards are often unable to cope with the associated impacts, due to their limited adaptive capacity. This in turn poses multiple threats to economic growth, wider poverty

reduction and the achievement of the millennium development goals (MDGs) (ADB et al 2003; Stern et al 2006).

Nepal has an agrarian economy. For many poor people, reliance on subsistence agriculture means that the impact of climate shocks and stresses are likely to have a negative implication for their food and livelihood security, human capital and welfare. Risks and uncertainties, often associated with seasonality, are typically embedded in agricultural practices and there is a need to scale up the coping and risk management strategies of the poor people to build more resilient livelihoods. Poor communities are not homogenous however, and it is important to understand the differentiated social impacts of climate change based on gender, age, disability, ethnicity, geographical location, livelihood, and migrant status (Tanner and Mitchell 2008).

## Disaster risk reduction, climate change adaptation and livelihood based social protection

The Intergovernmental Panel on Climate Change (IPCC) defines Climate Change Adaptation (CCA) as an adjustment of the natural or the human systems that occurs in response to actual or expected climatic

*Poor communities are not homogenous however, and it is important to understand the differentiated social impacts of climate change based on gender, age, disability, ethnicity, geographical location, livelihood, and migrant status*

changes or their effects. In human systems, adaptation can reduce hazards or exploit opportunities. Disaster Risk Reduction (DRR), as defined by UNISDR, is "the systematic development and application of policies, strategies and practices to minimize vulnerabilities, hazards and the unfolding of disaster impacts throughout a society, in the broad context of sustainable development" (UNISDR 2004).

Social protection describes all initiatives that transfer income or assets to the poor, protect the vulnerable against livelihood risks, and enhance the social status and rights of the marginalized. Its overall objectives are to extend the benefits of economic growth and to reduce the economic or social vulnerability of poor, vulnerable and marginalized people (IDS 2006; Devereux and Sabates-Wheeler 2004).

Livelihood-based social protection qualifies to be a livelihood-based social protection intervention if it provides a means of bringing the most vulnerable groups into the development process through protection, prevention and promotion within a transformative agenda to ensure the immediate and future livelihoods of these groups (FAO 2012). There is no doubt that economically poor and marginalized

communities have been suffering more than others from climate uncertainties and disaster risk. Hence, livelihood based social protection is promptly needed in our context. Integrating community-based DRR and CCA at the policy and practical level is crucial to aid effectiveness and successful integration that reduces both duplication of efforts and confusion at the community level (Sharma 2011). Now, it is the time to move toward promotion of livelihood based social protection while integrating CCA and DRR without any delay.

Social protection, DRR and climate change adaptation have much in common in terms of measures and broad objectives. They all seek to take integrated, multi-sectoral approaches to mitigate risks faced by poor people (See table below). They tackle the impact of, and seek to make individuals, communities and societies more resilient and less vulnerable to shocks and stresses. They are also all in relatively formative stages of development and testing, rather than established components of development and poverty reduction, particularly in low-income countries (IDS 2008).

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### Promoting adaptation through social protection (IDS 2008)

SP Category	SP Instruments	Adaptation and DRR benefits
Protective (Coping strategies)	<ul style="list-style-type: none"> <li>• social service provision</li> <li>• social transfers (food/cash), including safety nets</li> <li>• social pension schemes</li> <li>• public work programmes</li> </ul>	<ul style="list-style-type: none"> <li>• protection of those most vulnerable to climate risks, with low levels of adaptive capacity</li> </ul>
Preventive (Coping strategies)	<ul style="list-style-type: none"> <li>• social transfer</li> <li>• livelihood diversification</li> <li>• weather-indexed crop insurance</li> <li>• social insurance</li> </ul>	<ul style="list-style-type: none"> <li>• prevent damaging coping strategies as a result of risks to weather-dependent livelihood</li> </ul>
Promotive (Building adaptive capacity)	<ul style="list-style-type: none"> <li>• social transfer</li> <li>• access to credit</li> <li>• asset transfers or protection</li> <li>• starter packs (drought/flood-tolerant)</li> <li>• access to common property resource</li> <li>• public works programmes</li> </ul>	<ul style="list-style-type: none"> <li>• promotes resilience through livelihood diversification and security to withstand climate related shocks</li> <li>• promotes opportunities arising from climate change</li> </ul>
Transformative (Building adaptive capacity)	<ul style="list-style-type: none"> <li>• promotion of minority rights</li> <li>• anti-discrimination campaigns</li> <li>• social funds</li> <li>• proactively challenging discriminatory behavior</li> </ul>	<ul style="list-style-type: none"> <li>• transforms social relations to combat discrimination underlying social and political vulnerability</li> </ul>

*Growing experience, together with improved evidence, suggests that it can contribute to poverty reduction and help move people into productive livelihoods.*

As with DRR and adaptation, social protection has witnessed a rapid rise in the development policy agenda. Growing experience, together with improved evidence, suggests that it can contribute to poverty reduction and help move people into productive livelihoods.

### Conclusion and way forward

Whatever the policy framework, lots of interventions on climate change adaptation and disaster risk reduction have been operating and it is noteworthy that many private sector actors are trying to incorporate CCA, DRR and social protection components to some extent. However, there should be uniformity in implementation and the government

should play a coordinating role to ensure that there is no duplication and enhance its sustainability, effectiveness and efficiency through proper policy frameworks to integrate all the components in time. Hence, there should be mutual understanding for both climate change adaptation and disaster risk reduction, and for sustainability purposes livelihood based social protection is equally important to include.

Some contextual ways forward to integrate CCA, DRR and livelihood based social protection are as follows:

- Concerned government bodies should sit together for proper policy and budgetary management to integrate all three components.
- There should be secured budget management with strong national and international climate negotiations in the case of climate change policy, mainstreaming of disaster risk reduction into development, and professional/commercial/scientific agricultural systems with proper land use plans for livelihood based social protection promotion.
- There should be increased emphasis on transforming productive livelihoods as well as protecting and adapting to changing climate conditions rather than simply reinforcing coping mechanisms.
- There should be an understanding of the structural root causes of poverty for particular people, permitting more effective targeting of

vulnerable groups to withstand vulnerability to multiple shocks and stresses.

- A rights-based rationale for action should be incorporated, stressing equity and justice dimensions of chronic poverty and climate change adaptation in addition to instrumentalist rationale based primarily on economic efficiency.
- There should be a longer term perspective for social protection policies that takes into account the changing nature of shocks and stresses.
- Practical guidance on the design and implementation of appropriate adaptation methods should be developed, taking into account the views of affected groups, particularly women, children and the elderly.
- Synergies and linkages between academics and practitioners from across the three disciplines should be strengthened to increase understanding, co-ordination and good practice.

In a nutshell, economic enhancement through livelihood based social protection in Nepal would be the base for the sustainability of climate change adaptation and disaster risk reduction interventions. A paradigm shift from a subsistence agricultural system to a commercial agricultural system with proper land use plans adopting the principle of sustainable development would be the base for the economic enhancement. Then only would a risk resilient community be established that has a strong coping capacity for climate uncertainties and disaster risk.

*Concerned government bodies should sit together for proper policy and budgetary management to integrate all three components.*

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*A paradigm shift from a subsistence agricultural system to a commercial agricultural system with proper land use plans adopting the principle of sustainable development would be the base for the economic enhancement.*

A close-up photograph of several millet panicles. The panicles are long, slender, and hang down, showing the individual grains. The background is a soft-focus green, suggesting a field of the same crop. The lighting is bright, highlighting the texture of the grains and the green leaves.

Asis Shrestha and Kamal Khadka

Photo: Asis Shrestha/LI-BIRD

**Millets: Adaptation options for  
smallholder farmers to climate  
induced stress conditions**

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*The common practice of growing diverse crops such as horse gram, cowpea and other legumes along with millets turn out the crop fields to become nutrient recyclers. Legumes, being prolific leaf shedders, act as natural manure to conserve soil moisture and maintain soil fertility*

## Background

The millets are a group of highly variable small-seeded grasses, widely grown around the world as cereal crops for both human consumption and fodder. Major cultivated millets are finger millet (*Elusine coracana*), foxtail millet (*Setaria italica*), proso millet (*Panicum miliaceum*), barnyard millet (*Echinochloa colosna*), little millet (*Panicum miliare*), pearl millet (*Pennisetum glaucum*) and sorghum (*Sorghum bicolor*). Millets are important crops in the semi-arid regions of Asia and Africa, with 97 % of millet production taking place in developing countries (McDonough et al. 2000). The crops are grown in diverse soils, varying rainfall regimes and in areas differing in thermo and photo periods and the resilience exhibited by these crops is helpful for adaptation to different ecological niches (Naik 2007). Millets grow well in dry-land while the small millets are especially adaptive ecologically and with limited input, these species can survive in sub-marginal areas of limited rainfall (30-40 cm annually) and relatively high temperatures (Seetharam et.al. 1989). The nature of millets clearly indicates that these are not only important for the food security of people living in harsh and difficult terrains but also for those living in other areas which are prone to adverse impacts of climate change.

Among the millets, finger millet is commonly grown in Nepal. It is either relayed with maize or grown as a major crop after harvesting maize. Farmers practice a bio-diverse method of traditional farming, i.e., they practice mixed cropping of legumes like horse gram, black gram, rice bean and soya bean with finger millet. This is itself an example of a resilient farming system.

## Small millets and multiple securities

The major cereals like rice, wheat and maize contribute to food security. In contrast, millets are crops of multiple securities contributing towards food, nutrition, health, livelihood and ecology. Millets have edible stalks with stay green character at maturity, which are the favored fodder for cattle. Besides, millets are store houses of nutrition and hence, produce nutritional security. Another positive aspect of millet is that the grains can be stored without any damage for years, thus making it suitable as a food security crop for highly food insecure regions of Nepal. The common practice of growing diverse crops such as horse gram, cowpea and other legumes along with millets turn out the crop fields to become nutrient recyclers. Legumes, being prolific leaf shedders, act as natural manure to conserve soil moisture and maintain soil fertility (Tiwari 2001). Thus, millets uses soil fertility for their growth but also return this fertility to the soil due to legume intercropping practice

More importantly, millets are store houses of nutrition. They are rich in crude fiber and mineral contents. By any nutritional parameter, millets are ahead of rice and wheat in terms of mineral content (FIAN India 2006). Millets are an important source of iron, calcium and phosphorus. Millet offers abundant quantities of  $\beta$ -carotene. These qualities indicate that small millets are in fact wonder grains. Despite these benefits, small millets do not enjoy the same status as rice amongst consumers because of the social prestige attached with eating rice in Nepalese society. Besides, the cultivation and post harvest aspects of millets demand heavy labour, which is in short supply these days. As a result, farmers are discouraged to continue its cultivation (LI-BIRD 2011). These facts indicate that millets have a significant role to contribute to nutrition security.

## Significance of small millets from the climate change perspective

### Millets for drought environments

Small millets are hardy in nature and can bear prolonged drought (ICRISAT 2001). They are grown under rain fed conditions and hence millets require a minimal amount of water for cultivation. Total precipitation required for finger millet farming is 25 % less than sugarcane and 30 % less than paddy crops. One kilogram of rice production requires almost 4000 liters of water while all millets are grown in un-irrigated conditions (FIAN India 2006). Therefore, millets have huge potential to cope with the increasing issues of water crisis and to become the food for security.

Table- Comparison of nutrient content of different cereals:

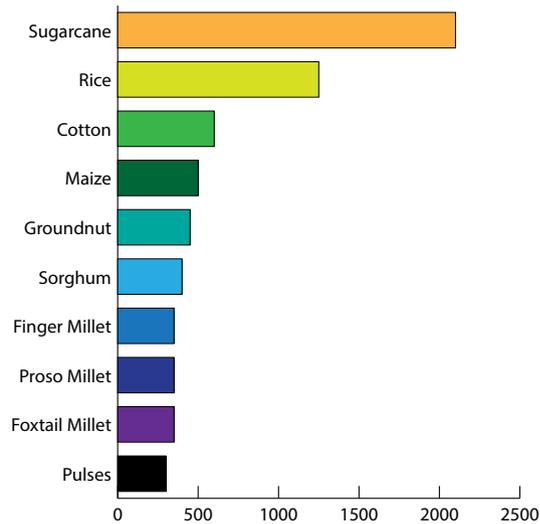
Crop\Nutrient (per 100g)	Carbohydrate	Protein (g)	Fiber (g)	Minerals (g)	Iron (mg)	Calcium (mg)
Finger Millet	74	7.3	3.6	2.7	3.9	344
Proso Millet	73	12.5	2.2	1.9	0.8	14
Foxtail Millet	60	12.3	8	3.3	2.8	31
Little Millet	61	7.7	7.6	1.5	9.3	17
Barnyard Millet	66	11.2	10.1	4.4	15.2	11
Pearl Millet	67	10.6	1.3	2.3	16.9	38
Kodo Millet	68	8.3	9	26	0.5	27
Rice	71	6.8	0.2	0.6	0.7	10
Wheat	78	11.8	1.2	1.5	5.3	41

(Source: Millet Network of India 2006 and FAO 1995)

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*Finger millet is cultivated in less fertile marginal lands, drought prone areas and steep shifting cultivation lands, which are the characteristics of hill farming systems*

Figure- Comparison of water requirements of different crops in millimeters



Source: Millet Network of India 2006

### Millets for marginal agriculture lands

Substantial harvest can be taken from millets grown in poor soils. Millet thrives well in adverse conditions like acidic and saline soils (McDonough et al. 2000). The capacity of millet to grow on poor soils can be gauged from the fact that they grow in very marginal soil in West Africa, which produces 74 % of all millets grown in Africa and 28 % of world production. These

crops flourish in ecological zones where average rainfall can be less than 50 cm with sandy and acidic soils. Millets are grown successfully in drought prone environments in Deccan and Rajasthan for human consumption and as fodder for livestock (FIAN India 2006). Finger millet is cultivated in less fertile marginal lands, drought prone areas and steep shifting cultivation lands, which are the characteristics of hill farming systems (Tiwari et al. 2004). These are the testimonies for the hardiness of these magical grains which have extraordinary capacity to survive in harsh environments.

“We grow finger millet in such pieces of land where we cannot grow any other crops. The difference in yield between finger millet grown in marginal and fertile soil is less significant.” Purna Bahadur Magar, Jogimara-4, Dhading. The word of this farmer demonstrates the worth of millet in the rain fed hills of Nepal.

### Ecological farming

Hardly any farmers apply chemical fertilizers and other inorganic external inputs to millets in the rural areas. In the Nepalese context most of the farmers apply farm yard manures to finger millet, foxtail millet and proso millet. Legumes like black gram, horse gram and soybean are commonly grown as mixed crops with finger millet. These are ecological farming practices promoting good soil health, control of soil erosion

and conservation of soil moisture. Farmers believe that farmyard manures, bio-fertilizers and composts are ideal to grow millets. These practices of millet production are not only eco-friendly but stay under the control of farmers.

“If we apply urea in finger millet, the reproductive performance of the crop decreases” says Khadga Bahadur Gurung, Dhikurpokhari-6, Kaski. This illustrates that millets do not demand chemical fertilizers. In fact, under dry land conditions, millets grow better in the absence of fertilizers.

“We used to grow foxtail millet and barnyard millet about 15 years back. These crops were resistant to blast. Now, these crops are almost out of cultivation except in some Chepang communities. Preference for rice and wheat are the main reason for the loss of these crops.” - Hariram Khatiwoda, Jogimara-3, Dhading.

Even in storage conditions, most millets are not damaged by storage insect pests. “Finger millet can be stored for more than 10 years. I still remember, in 1961, whole paddy and millet fields were damaged by a hail storm. My father distributed finger millet grain to the villagers which had been stored for more than 7 years.” – Durga Dutta Poudel, Dhikurpokhari-5

## Millets to cope against climate crisis

Millets could be one of the farming options to negotiate with the climate induced epidemic the farming community will be dealing in the future. The

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*Hence, millets are grains to feed the hungry world and at the same time contribute to nutritional security, especially for women and children living in rain fed regions.*

magnitude of change in global climatic scenario will impose a serious challenges like

- Rise in temperature
- Increasing water stress
- Declining food and nutritional security

Millets have the capacity to cope with the adversities arising from the changing climate. They have an extraordinary capacity to grow under drought conditions. Millets are grown at varying altitudes covering a wide range of ecological niches. In addition, millets are storehouses of most of the essential major and micro nutrients. Hence, millets are grains to feed the hungry world and at the same time contribute to nutritional security, especially for women and children living in rain fed regions.

“A few years ago, I used to grow rice in bari land also. Now, the monsoon has been delayed. This has made paddy cultivation rather impossible. This is the reason I switched to finger millet farming in this land.” Bhim Prasad Subedi, Kaskikot-2, Kaski.

“In Khoriya (slash and burn system of cultivation) no other crop gives as much yield as millets.” Purna Chepang, Jogimara-7, Dhading.

“Ghaiya (upland rice) farming has been replaced by finger millet. This is mainly due to less rainfall and an increase in disease pest attack in Ghaiya during the recent years.” Chandra Lal Shrestha, Jogimara-8, Dhading.  
“There are less [negative] effects of climate change

on finger millet. The major factor behind reduction in finger millet farming is the organoleptic preference to cereals like rice and wheat. If we are to cope with the problem of low rainfall, then we should promote millet farming.” Sagun Gurung, Dhikurpokhari-6, Kaski.

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## Revalorizing millets

Millets have been neglected by the research and extension systems of all nations across the world. In the changing context, the time has come to give recognition to millets as a climate resilient miracle crop. One of the initiatives funded by International Development and Research Centre, IDRC and Canadian Development Agency, CIDA under Canadian International Food Security Research Fund, CIFSRF programme, Revalorizing Small Millets in Rain fed Region of South Asia (RESMISA), has been operating in Nepal, India and Sri Lanka to promote conservation, cultivation and consumption (3 Cs) of millets with a major focus on small millets. RESMISA is a regional consortium led by DHAN Foundation, India and implemented in three South Asian countries, viz., Nepal, India and Sri Lanka. LI-BIRD serves as the implementing organization for this project in Nepal. Beginning from March 2011, the project is focused on the conservation and use of millet diversity, development and promotion of agronomic packages of practices for millet farming, and awareness raising and value addition of millets. It is also making efforts to generate evidence for policy advocacy to mainstream millets into the national research and extension system at a broader scale. Whatever the outcomes generated from this project, the responsibility of popularizing millet is not the mere responsibility of IDRC, CIDA, LI-BIRD or the national system. It is the duty of all humans who

need food to survive and to combat the changing climate. Some future actions for developing millets as a tool to tackle climate crisis are as follows:

1. Local production should be emphasized rather than distribution of rice and other cereals under food aid programmes in all the developing countries around the globe.
2. Increasing varietal options and promotion of mechanization in cultivation and post harvest operations, along with raising awareness among the consumers, is vital in promotion of the cultivation of millets.
3. Mainstreaming millets in the national research and extension system plays an important role in the promotion and use of these neglected crops. It is essential that the national research system take initiatives to create more varietal options and to develop more agronomic interventions for a sustainable farming system.
4. Traditional knowledge should be given due consideration and farmer led initiatives/research add valuable perspectives to modern theories and techniques.

*It is also making efforts to generate evidence for policy advocacy to mainstream millets into the national research and extension system at a broader scale.*

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*Traditional knowledge should be given due consideration and farmer led initiatives/research add valuable perspectives to modern theories and techniques.*

Uttam Khanal, Keshab Thapa, Kesh Bahadur Thapa

Photo: Uttam Khanal/LI-BIRD

# Climate change adaptation practices against water scarcity in High Mountain areas

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*Adaptation is one of the immediate options for reducing the negative impact of climate change.*

## Background

Climate change and associated impacts are of great concern to Nepal where more than 70 % of employable populations are employed in climate sensitive sectors like agriculture for their livelihood. Nepal has experienced an average annual temperature rise of 0.06 degree celcius. Despite having only 0.38 % of the total global population and being responsible for only 0.025 % of total GHG emissions in the world, Nepal has been disproportionately affected by the adverse impacts of climate change and the resultant longer period of drought, intense rainfall, changes in annual rainfall (Lamichhane and Awasthi 2009; WECS 2011). Most importantly, the rate of temperature increase is higher in mountains areas, resulting in the less snow and the less water availability. Experts and local communities have already observed such changes (Webersik and Thapa 2008). Vulnerability assessment and other participatory rural appraisal exercises in the Marpha and Pangling villages of Mustang district identified major impacts of climate change as increased temperatures, prolonged dry spells, less snowfall and change in rainfall patterns, affecting the major livelihood sectors, particularly agriculture, forest and rangeland. Farmers claimed that some of the spring sources of water have dried up or even disappeared and that the levels of water in the available streams are also declining. According to farmers, before 10 years, water from these sources used to be sufficient

to fulfil the needs of the villagers for farming and livestock keeping. But these days farmers are facing water crisis.

Adaptation is one of the immediate options for reducing the negative impact of climate change. A number of adaptation strategies can be found in semi-arid areas of Nepal. These were either developed by local farmers themselves in past, so-called indigenous adaptations strategies, or together with projects and extension services over the last few years. In 2011/12, LI-BIRD with support from ICIMOD and ADB piloted some climate change adaptation oriented participatory action researches for improving high mountain agribusiness and livelihoods of mountain communities in Marpha and Pangling villages of Mustang district. Adaptation practices identified by the projects to be feasible for high mountain semi-arid regions of Nepal are discussed below.

## Mulching

The climate of Mustang District is dry with strong winds and intense sunlight (NTNC 2008). Farmers realized that the strongly blown wind evaporates the soil moisture. Worldwide, successful cases have been documented regarding mulching techniques to improve water use efficiency and yield in various tree crop species. Allen et al. (1998) stated that mulches are effective in reducing

evapotranspiration of crops and in increasing crop growth rate and yield. Seidhom and Evon (2006) found a significant increase of fruit yield, water consumptive use, irrigation water use efficiency coefficient, crop coefficient, environmental stress coefficient, water use efficiency, water economy and investment ratio through mulching. Piloting of mulching on 16 apple plants in Marpha village resulted in increase fruit yield, less weed infestation and improved soil moisture. Farmers and the stakeholders perceived that in the context of climate change and resultant drought, mulching is an effective method for moisture conservation and weed management.

## Rainwater harvesting and artificial recharge to groundwater

The sloping hills of major parts of Mustang District are bare and tree growth rate is slow in the regions where trees grow. Farmers and local stakeholders perceived that bare hills and slow growth of trees were due to low soil moisture content. The construction of contour trenches was identified as an adaptation strategy to climate change and subsequent soil water decline. As precipitation occurs and rainwater flows down the hillsides, increasingly gathering speed, the contour trenches serve to act as speed breakers, control erosion as well as harvest water. Harvested water in these trenches percolates into the ground and recharges aquifers.

The contour trenches constructed in the hills near Marpha Village to hold rain, snow and runoff water to enhance growth in pine and Thuja plants resulted in faster growth of trenched plants as compared to non-trenched plants in terms of height and canopy radius. A monthly average increase in the height of plants is 4.1 and 3.2 cm for trenched plants and non-trenched plants, respectively. Our study revealed that monthly average increase in the canopy radii of plants is 1.4 and 0.8 cm for trenched plants and non-trenched plants respectively. Farmers realized that trenching improves recharge of water by allowing more water or snow to infiltrate through the soil and hence enhances the faster growth of plants.

## Drip irrigation

Lack of irrigation water is one of the major problems for agriculture in most parts of Mustang District. Farmers have perceived increased intensity of drought and less rainfall/snowfall in recent years. Moreover, the flow of water in the stream is also decreasing. Use of drip irrigation has been identified as one of the best methods to increase water use efficiency. Compared to conventional irrigation (bucket irrigation), drip irrigation in cauliflower resulted in a saving water by 31.25 %. Using drip irrigation in the village, farmers can increase cauliflower cultivation in 45.5 % more area using the same source of water. Moreover, the average production per plant increased by 14.28 %, the cost of labour for irrigation decreased by 40 % and

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the cost of labour for weeding and earthing up was reduced by 33 %. Due to the lack of irrigation water, abandonment of the agricultural land is common in the village. Ngigi (2009) reported that shifting from surface irrigation to drip irrigation will increase irrigable area by 200 %, improving irrigation efficiency from 25 to 75 % using the same volume of water. The drip irrigation system has been identified as an adaptation practice against the scarcity of irrigation water in the area.

### Plantation along the irrigation canal

The dry climate and strongly blown wind increases the evaporation of water from the irrigation canal. In the context of a shortage of irrigation water in the area, the plantation of trees along the irrigation canal is considered a good practice to reduce the evaporation loss from the irrigation canal. Salix plants were planted along the irrigation canal of Pangling Village. It is expected that besides reducing the loss of irrigation water, this will also increase fodder availability and support the natural occurrence of vegetation in the area. In the climate changing scenario this strategy is identified as an adaptation measure against the declining water availability, fodder availability and pasture degradation.

### Conclusion and recommendation

Nepal is a water rich country, but also vulnerable to changing climate. The local context varies from location to location, so it is necessary to consider climate change and its consequences in development plans at local, regional and national levels. Mulching, contour trenches, drip irrigation and plantation along irrigation canals utilize water that otherwise would have been returned to the atmosphere through evaporation. These conservation practices and technologies have been found effective to reduce the risk of water shortage in the context of climate change in the high mountain semi-arid region of Nepal. To address the issues of climate change at the local level it is necessary to begin by involving the people living in the these resource fragile and vulnerable areas in assessing solutions and interventions that support building the adaptive capacity of the local community and that help to stabilize the fragile ecological area.

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Reshna Udas

Photo: LI-BIRD Photo Bank

# Impact of Climate Change on Forests

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*Forests are being lost and degraded at an unprecedented rate, due in part to population growth and agriculture expanding to meet the growing global food demand and because of increasing threats from the negative effects of climate change.*

## Background

According to the United Nations Framework Convention on Climate Change (UNFCCC) 2001: "A forest is a minimum area of land of 0.05-1.0 hectares with tree crown cover (or equivalent stocking level) of more than 10-30 percent with trees having the potential to reach a minimum height of 2-5 metres at maturity *in situ*. A forest may consist either of closed forest formations, where trees of various storeys and undergrowth cover a high proportion of the ground, or of open forest formations. Young natural stands and all plantations which have yet to reach a crown density of 10-30 % or a tree height of 2-5 metres are included under the definition of forest, as are areas normally forming parts of the forest area which are temporarily unstocked as a result of human intervention such as harvesting or natural causes but which are expected to revert to forest.

Forests cover more than 30 % of global land area. Forests provide goods and services that are important to both human welfare and development and to ecological integrity, including the control of erosion and water flows, and the cleansing of air and water of pollutants. These are all important forest values, although their importance is not necessarily assessed in terms of dollars. Forests are being lost

and degraded at an unprecedented rate, due in part to population growth and agriculture expanding to meet the growing global food demand and because of increasing threats from the negative effects of climate change.

The UNFCCC and the Kyoto Protocol explicitly recognize the important role of forests in global climate change and, therefore, commit all parties to protect them and manage them sustainably. In general, climate change will affect the condition of forests (health, area, biodiversity, etc.) allowing increase in growth area in some places while the vulnerability of some species and forest dependent communities might increase. Variability in rainfall and increases in temperature will affect the frequency and intensity of forest fires, pathogen outbreaks, introduced species and the rate of damage done by extreme weather events like floods, drought, hailstorms, etc. However, forests play an important role in climate change, both as sinks and sources of carbon dioxide. Two types of activities that can be used to mitigate climate change in the present world context are reducing greenhouse gas emissions and increasing carbon sequestration. This paper provides an overview of the impacts of climate change on forests and some adaptation strategies to deal with these.

## Relation between climate change and forests

Forests are major contributors to the Earth's ability to maintain its climate, through the global impact of their photosynthesis. Climate change and forests are intricately linked. On the one hand, changes in global climate are already stressing forests through higher mean annual temperatures, altered precipitation patterns and more frequent and extreme weather events. At the same time, forests and the wood they produce trap and store carbon dioxide, playing a major role in mitigating climate change. In the Millennium Ecosystem Assessment it is reported that the amount of carbon stored in the world's forests is between 335 and 365 billion tons. However land use change (largely resulting from deforestation) is hindering the carbon sequestration abilities of forests. As forest ecosystems are important sinks for carbon, their loss has serious implications for climate change.

## Key climate change impacts on forests

Forests generally flourish best in warm, wet environments and do progressively less well as temperature and moisture decrease. Thus forests would be expected to respond to changes in temperature and to increases or decreases in

precipitation brought on by climate change. The types of trees growing at a given site might give way to those more suited to the new climatic conditions, or a forest might cease to exist altogether. Forests are particularly sensitive to climate change, because the long lifespan of trees does not allow for rapid adaptation to environmental changes. Long-term impacts of changes in air temperature, precipitation, atmospheric CO<sub>2</sub>, and ozone (O<sub>3</sub>) and their variation could have significant impacts on forests. Although more CO<sub>2</sub> in the atmosphere may encourage tree growth, the negative impacts of climate change are expected to far outweigh any benefits.

## Shifting of tree lines

The boundary of the forest is known as the tree line, although it is usually not a distinct line. This important boundary exhibits common features in all parts of the world (Tranquillini 1979; Beneke and Davis 1980; Holtmeier 2000). Certain plant species shift to higher altitudes to escape increased temperatures, making insects and herbivores shift with them and forcing carnivores to co-migrate with their prey populations. From Nepal, early flowering and sustained diseases to native tree species, particularly *Alnus nepalensis*, have already been documented (Dahal 2006 and Thakur 2008).

*As forest ecosystems are important sinks for carbon, their loss has serious implications for climate change.*

*Climate change is making forests more prone to damage by altering the severity or intensity, frequency of occurrence, and duration of disturbances such as fire, storms and landslides.*

## Forest biodiversity

Forest biodiversity is directly affected by temperature, the concentration of CO<sub>2</sub> in the air, mineral nutrition, and water supply, all of which are expected to change in the coming decades. In addition to such direct effects, climate also affects forest plant communities indirectly through plant-to-plant competition for site resources (e.g., water, light, nutrients).

## Forest disease

Diseases respond to stress in plants in various ways such as increased incidence or severity. When stressed, a normally resistant tree species may become susceptible to a certain disease, broadening the host range of the pathogen. Stress caused by an increase in the number and severity of catastrophic weather events, especially drought, may increase disease susceptibility, especially where plants are not physiologically adapted to a site or are near the limits of their range (McDonald et al. 1987).

## Forest soils

Soils hold important clues about shifts in hydrology and vegetation across the landscape because, in terrestrial systems, soil characteristics govern the reception, storage and redistribution of

precipitation. This, in turn, determines the supply of water available for plants and, indirectly, the nutrients necessary for plant establishment and growth. Because soils with more water are less sensitive to warming, changes in soil moisture result in changes in soil heat capacity and conductivity, which, in turn, affect infiltration and water transport in the soil profile (Cherkauer 1999 and Iwata 2008). Plant growth generally increases with soil temperature, but it can also decline where nutrient deficiencies are induced or soil water availability is reduced through increased rates of evapotranspiration (Pendall et al. 2004)

## Abiotic disturbances

Abiotic disturbances, or disturbances caused by nonliving factors, differ in duration, ranging from hours to days for cyclones or windstorms, weeks to months for fires, and days or weeks for volcanic eruptions (Turner 2010). The timing of many disturbances is controlled by climate. Climate change is making forests more prone to damage by altering the severity or intensity, frequency of occurrence, and duration of disturbances such as fire, storms and landslides. When disturbances exceed their normal range of variation, the impact on forests can be extreme, affecting the forest structure, composition and functioning, and biological diversity as well as facilitating regeneration.

## Forest health

Climate change has serious impacts on the health of forests. As temperatures rise, weather patterns and the availability of water also change, thus putting more stress on trees for their survival. This could force forest types to shift their ranges faster than they are able to adapt.

## Forest fire

The most influential implication of climate change for forest fire management is the predicted increased frequency and severity of drought years. Clearly, during years of much lower than normal rainfall, fuel moisture levels decrease and forests are predisposed to fire. This is manifested as an increase in the forest fire weather severity rating (Williams 1959, Van Wagner 1987) and an integration of weather factors (temperature, relative humidity, wind speed and precipitation) over periods of various lengths (daily, monthly, seasonal, etc.).

In 36 years, from 1971 to 2007, more than 3880 forest fire events were reported in Nepal, leading to 1108 deaths and 186 missing persons, and affecting more than 218 278 people (NSET 2009). During the spring of 2009, forest fires blanketed much of Nepal, raging in 634 places and damaging 105 350 hectares of forest land (NCVST 2009).

## Strategies for dealing with negative impacts of climate change in forest

Adaptation to climate change could occur naturally, through natural regeneration and tree migration, and could also be facilitated by human action if managers replant disturbed forests with species or varieties more suitable to the changed climate and establish new, replacement plantations in more suitable locations. The development of planting stock with desirable genetic traits may be a promising avenue to counter changes in the local climate.

Management can be designed to reduce the opportunity for disturbance to occur. Examples are regulations that limit the introduction of non-native species, the imposition of burning restrictions, changed harvesting patterns, rotation periods, improved fire management through landscape change and prescribed burning. Trees can be planted that are less susceptible to disturbance. Species that promote disturbances can be removed. Density of trees can be managed to reduce the potential for future insect outbreaks or storm damage. Environment-friendly roads can be designed to reduce the potential for landslides in forest areas.

*As temperatures rise, weather patterns and the availability of water also change, thus putting more stress on trees for their survival.*

*The health of many forest ecosystems is already affected by climate change, and the impact is likely to accelerate, with local and global negative consequences that will likely outweigh growth increases linked to climate change.*

Agroforestry has potential for providing benefits in adaptation–mitigation synergies in developing countries because it enhances diversification reduces risk and helps stabilize livelihoods.

Sustainable forest management is a system of forestry practices that aims to maintain and enhance the economic, social and environmental values of all types of forests. In the context of climate change, the principles of sustainable forest management can be applied to reduce the exposure and sensitivity of a forest and therefore its vulnerability, and/or to enhance its adaptive capacity. Sustainable forest management, therefore, can play an important role in climate change adaptation. At present, however, many forests are not managed sustainably.

## Conclusion

Forestry needs to be planned well in advance of expected changes in growing conditions because the forests regenerated today will have to cope with the future climate conditions of at least several decades, and often more than 100 years. The health of many forest ecosystems is already affected by climate change, and the impact is likely to accelerate, with local and global negative consequences that will likely outweigh growth increases linked to climate change. Adaptation is possible, but it is essential to plan and act soon to avert the most detrimental impacts and capture opportunities.

## Way forward

Climate change is only one factor affecting forests and the people depending on them for their livelihoods. Others include human population growth, changes in the area of croplands and pasturelands, epidemic diseases, invasive species, forest fires and industrial pollution. The effects of such factors, and their interactions with climate change, complicate analyses of the impacts of climate change on forest goods and services and must be assessed in detail.

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## Past Events

### Training on Climate Change Adaptation

LI-BIRD organized a three day national level Training on Climate Change Adaptation for government agricultural officers. The training took place in Pokhara from 20th to 22nd December 2012. The main goal of the training was to empower agricultural officers regarding climate change so that they, in turn, will be able to improve the capabilities of smallholder farmers to respond to climate change.

#### Background and objectives

Farmers in Nepal are facing many uncertainties, economically and politically as well as environmentally. They are increasingly being affected by changes in weather patterns. They lack information on climate change and climate variability, making it difficult for them to make informed decisions over the most appropriate agricultural practices. LI-BIRD, through its Community Resilience to Climate Change programme, is working to build the capacities of farmers in order to take account of climate risks and adapt to future climate change in order to build better, stronger, and more resilient livelihoods.

LI-BIRD is also working with agricultural officers to make them better able to understand the impacts of climate change on local

agriculture. This will in turn enable them to provide better advice to farmers. In this context, capacity strengthening of government agricultural officers is very important in order to strengthen their service delivery to farmers and to mainstream climate change adaptation in agricultural systems of Nepal so that agricultural officers can facilitate smallholder farmers to adapt to, and cope better with, climate variability and change.

The major objectives of this training were to provide exposure to the fundamentals of climate change and science relevant for agriculture, to capacitate participants to understand and gain applicable knowledge in climate change and climate change impacts on agriculture, to provide participants systematic understanding of climate change adaptation (options, measures, scientific adaptation, spontaneous adaptation, adaptive capacity, etc.) and various types of livelihoods based adaptation options . Content and achievement

The training was inaugurated by Dr. Shreeram Neopane, Executive Director, LI-BIRD. The training programme was developed with active contribution of the resource persons from various areas of climate change and agricultural professions. Trainers represented multidisciplinary backgrounds and possessed a wide range of experience of working in livelihoods based adaptation in the agriculture sector and climate change programmes. Some of the

key resource professionals and trainers for this programme were Keshab Thapa, Programme Coordinator, Community Resilience to Climate Change (CRCC); Krishna Lamsal, Programme Officer, CRCC; Suman Shekhar Manadhar, Programme Coordinator, Knowledge Management and Capacity Building; Kamal Khadka, Programme Coordinator, Agricultural Innovation for Livelihood Strategy; Roshan Pudasani, Project Officer, Home Garden; Sandesh Neupane, Project Officer, Community Based Biodiversity Management; Manjeet Dhakal, Climate Change Expert and Raju Chettri, Climate Champion. The interactive presentation included topics on theoretical perspectives of climate change including the definition of climate change; how it occurs; potential benefits, negative effects and ways forward associated with climate change; climate change vulnerability, adaptation and resilience in relation to sustainable livelihood frameworks; situation analysis of climate change impacts using a rich picture; building climate resilience of communities through community-based biodiversity management; enhancing adaptive capacity of smallholder farmers through integrated home gardens; agricultural innovations in the context of climate change adaptation; potential benefits of participatory crop improvements using PPB/PVS; local innovations and climate change adaptation; international negotiations on climate change and outcomes in relation to climate change adaptation; outcomes of 18th conference of parties meeting to the UNFCCC.

The training was able to strengthen the knowledge of 26 government agricultural officers on climate change, mitigation/adaptation, especially focusing on biodiversity and agriculture. Participants were also made aware on national and international context/scenarios, laws/policies and negotiations. Most of the participants had limited knowledge and understanding regarding

the issues of climate change and were participating for the very first time but they actively participated in the discussions. The participants realized that irregular rainfall and erratic flash floods may be the consequences of climate change. In addition, they have internalized that the agriculture sector is especially hit hard by the impacts of climate change

### Recommendation and follow-up

From the overall interaction it became clear that there is a great demand for further training on climate change and adaptation issues in the future. More trainings on the wider issues of adaptation, as well as more frequent trainings, were also asked for. Participants expressed that farmers continue to practice the traditional ways of farming because they remain unaware of the ecological changes being caused by climate change as well as about new agricultural technologies. Now they intend to implement their learning about climate change in the field. They will be teaching farmers in remote areas about the impacts of climate change on agriculture and training them to use low water-fed irrigation technology or to find new crop species as initial activities to help farmers to address climate change impacts.

## Linking Media and Climate Change: Refresher Workshop

A follow-up workshop for last year's regional workshop of Linking Media and Climate Change' was organized by LI-BIRD in Pokhara from 20th-21st December 2012. The workshop was attended by 16 participants, 13 of whom had attended the workshop in the previous year. The main objectives of the workshop were to follow-up on the success of last years' workshop; to provide updated scientific information on environmental issues, particularly with regard to increasing impacts and vulnerability due to growing climate and socio-economic changes and adaptation needs of the people; recap on story cycle concept and website; experience sharing and lessons learned in climate change reporting and identifying ways forward for the Media Network on Climate Change.

The two day workshop was inaugurated by Krishna Prasad Baral, Vice President, Executive Board, LI-BIRD. The workshop was facilitated by Pusparaj Tiwari, Senior Programme Officer; CCRC, Mahesh Shrestha, Training, Information and Publication Officer, KMC; Reshna Udas, Project Officer, CRCC; Sahajman Shrestha, Journalist/Coordinator, MTC/NEFEJ and Saurav Dhakal, Journalist/ Story Teller.

The workshop consisted of briefings from climate change specialists followed by question and answer sessions; interactive discussions between participants on how best to cover the subjects, facilitated by experienced journalists and networking opportunities specifically tailored to the situation in Nepal. Besides this, sharing on COP 18 and the Great Himalaya Trail



Photo: LI-BIRD Photo Bank

provided participants with the realization of the media's strong role to influence the general population. This workshop provided an appropriate platform where local media persons discussed, learned and share good practices as well as difficulties faced during reporting about climate change, its effects, adaptations methods and their roles in climate change education, communication and public access to information. It consisted of informative and skills-building sessions on climate change issues ranging from technical-scientific knowledge to effective political advocacy.

As a follow-up measure, it was decided that a media network person's gathering/sharing/updating meeting should be conducted once every two months.

## Training on Climate Change Vulnerability Assessment and Adaptation Planning

Training to NGO network members on Climate Change Vulnerability Assessment and Adaptation Planning was conducted in three development regions of Nepal, viz., the Eastern, Western and Far Western Development Regions. In the Eastern Region the programme was facilitated by Namsaling Community Development Centre (NCDC), in the Western by SAHAMATI and in the Far Western by YAC-Nepal.

### Background and objectives

Methods of vulnerability assessment have been developed over the past several decades in the fields of natural hazards, food security, poverty analysis, sustainable livelihoods and related areas. This training presented a structured approach to climate change vulnerability assessment; the emphasis was on the activities and techniques that a technical team could readily implement in the field.

The main objectives of this training were as follows:

- Understand vulnerability assessment in the broader context of adaptation planning and other relevant contexts
- Evaluate the different factors influencing vulnerability and how they can affect the outcome of vulnerability assessments
- Identify, critique and evaluate approaches for conducting a vulnerability assessment and choose among the options
- Design a vulnerability assessment applicable to their needs

- Evaluate and interpret the results of vulnerability assessments and recognize next steps
- Communicate the purposes, methods, and results of vulnerability assessments to others
- Develop (elements of) a vulnerability assessment work plan/ statement of work, including level of effort

### Content and Achievement

The training consisted of presentation, group work/exercises, a documentary, discussions, brainstorming, games, and a field visit. Starting with the simple and basic concept of climate change, the participants were trained to carry out the vulnerability assessment and adaptation planning.

The training helped participants to understand the impact of climate change along with assessing climate change vulnerability and adaptation options with simple user friendly social tools like timeline, hazard matrix, hazard prioritization, resource mapping, identification of adaptation options and prioritization, stakeholder mapping and adaptation planning.

This training also highlighted that there is a complex chain of impacts between physical changes in climate and eventual impacts on human societies. Participants representing the different NGOs/CBOs also realized the importance of involving local communities and stakeholders in vulnerability analyses, as these are the people who have the best knowledge of their socio-economic context. People's perception of climate change is also important to understand, as this influences the way that they adopt different adaptation strategies.

## Conclusion

Participants indicated that undergoing a vulnerability assessment could to some extent help them achieve the changes they want. This is because the process helps them to think critically about issues in a holistic way, and can lead them along the right path in making desired and beneficial changes or helping the community to adopt adaptation activities. The trained participants will be able to integrate the climate change component in their respective programme/ activities by looking at the problems through the climate lens.

# C A L L for A R T I C L E for

## The 6th issue of 'NGONCC Bulletin'

'NGONCC Bulletin' is an annual bulletin that has been published since 2008 to bridge the gap on information dissemination on various dimensions of climate change in Nepal. The bulletin portrays different aspects of climate change, with the help of various articles and cases, that include analysis of climate change policies and programs, approaches to climate change adaptation and mitigation, assessment of community vulnerability and adaptation planning, , climate change and disaster risk reduction, networking, etc.

Until now, Nepal has prepared climate change policy, National Adaptation Programme of Action (NAPA), Framework of Local Adaptation Plan for Action (LAPA), draft policy on Reducing Emissions through Deforestation and Forest Degradation (REDD), and some initiatives for Community Adaptation Plans of Actions (CAPAs). Such policy actions have initiated some efforts on mainstreaming climate change in the national planning process that demand for more local actions in a planned way. Still, climate change sensitization and interventions are yet to reach a majority of climate vulnerable communities of the country. Awareness on climate change has reached to the government line agencies, INGOs, and major NGOs working in various districts of Nepal. Communities of some areas/districts are also aware on preparations of Local Adaptation Plans for Action (LAPAs) and Community Adaptation Plans of Action (CAPAs). However, implementation

of such plans requires a multi-stakeholder approach to achieving greater programs synergy and leveraging resources.

In this regard, we call for the articles for the 6th issue of NGONCC bulletin in the following areas of climate change including, but not limiting to, policy analysis (international, national and local), adaptation, mitigation, and capacity building, technology transfer, loss and damage, local innovations on adaptation and mitigation to climate change, climate change and disaster risk reduction, etc.

### General guidelines for the articles are as follows:

- The articles must be written in English with less than 2000 words in Microsoft Word file.
- Font should be 'Times New Roman' and font size '11' with single line spacing.
- Title of the article should not exceed 20 words followed by authors name and their affiliation and contact address. It should be in title case.
- Abstract should not exceed 150 words with a reflection of the context of the key issue, analysis, conclusion and key recommendations.
- Headings and subheadings should be in title case.
- Also include article relevant photographs (not more than 5) with brief description and photo courtesy.
- Referencing need to be APA citation style. For detail please follow (<http://www.library.cornell.edu/resrch/citmanage/apa>)

Please send your articles not later than October 30, 2013 to [kthapa@libird.org](mailto:kthapa@libird.org)



NGO Network on Climate Change is a loose network established and coordinated by Local Initiatives for Biodiversity, Research and Development (LI-BIRD) in 2007, to raise awareness and build capacity of key development NGOs working in Nepal. The goal of the network is to provide a common platform for national NGOs working on climate change and development issues to share knowledge, develop joint actions, build capacity, discuss climate change policies, and to represent civil society organisations in climate change debates.

The network aims to build the capacity of network members through knowledge sharing, promoting research, technology transfer, and information dissemination. The network acts as a forum for discussion on national climate change agendas and it brings climate concerns to the attention of national and international authorities in collaboration with other national, regional and international networks.

At the end of 2012, the network has 125 member NGOs from all development regions of Nepal and 41 districts with a core group of 17 members, and 5 regional secretariats.



## Regional Secretariats of NGO Network on Climate Change



### Further Information

NGO Network on Climate Change Secretariat  
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