Combined Profile 4
Title: GLOF Monitoring and Disaster Risk Reduction
Activity Components: · Monitoring of GLOF and reducing climate-related disaster risks · Developing early warning systems in disaster prone areas · Linking climate change with disaster risk reduction and enhancing institutional capacity at different levels · Mapping of hazards, assessing disaster impacts, and developing contingency plans · Managing existing hydrological and meteorological network at the Department of Hydrology and Meteorology (DHM) and scaling-up its services · Initiating GLOF and disaster-related research and development activities
Estimated total cost: USD 55 million

Combined Profile 5
Title: Forest and Ecosystem Management for Supporting Climate Led Adaptation Innovations
Activity Components: · Managing trees outside the forests in public and private land (agro-forestry practice) · Maintaining the balance between fuel wood demand and supply for rural household energy through plantation · Scaling- up of biomass energy technologies (quantity, quality, and coverage) for less fuel wood consumption · Managing community-based forest fire in mid-hills and Terai
Estimated total cost: USD25 million

Combined Profile 6
Title: Adapting to Climate Challenges in Public Health
Activity Components: · Reducing public health impacts of climate change through evidence based research and piloting · Empowering communities through public education for responding adverse effects of climate change in public health · Investigating disease outbreak and emergency response · Scaling up programmes on vector borne, water and food borne diseases and disasters · Strengthening forecasting / early warning and surveillance system on climate change and health
Estimated total cost: USD 15 million

Combined Profile 7
Title: Ecosystem Management for Climate Adaptation
Activity Components: · Promoting improved pasture and range land management techniques to rehabilitate degraded mountain ecological zones · Conserving and promoting medicinal plants and NTFPs in all potential ecological zones · Initiating integrated wetland management in Terai · Managing biological corridor in the Terai and mountains
Estimated total Cost: USD 31 million

Combined Profile 8
Title: Empowering Vulnerable Communities through Sustainable Management of Water Resource and Clean Energy Supply
Activity Components: · Conserving lakes supplying water and ecological services to urban areas · Promoting rain water harvesting structures and technologies · Conserving water supply source (quality as well as quantity) and strengthening programs of existing projects affected by source reduction · Developing nationwide urban groundwater monitoring system and enhancement of regulatory measures · Establishing and improving micro-hydropower projects being affected by the acute water shortages · Improving water mills for multi use
Estimated total cost: USD 40 million

Combined Profile 9
Title: Promoting Climate Smart Urban Settlement
Activity Components: · Enforcing building codes in municipal areas incorporating climate change dimensions · Rehabilitating the vulnerable communities · Increasing the efficiency of the use of underground water resources for urban population · Establishing municipal compost plants and developing strategy to link with Clean Development Mechanism (CDM) to generate additional revenue · Building the capacity of local level institutions for efficient water and energy planning and project implementation
Estimated total cost: USD 30 million

5.2 Challenges and barriers to implementing adaptation measures

Weak governance due mainly to an extended political transition and various other factors has hindered the country's normal development. This has limited the State's ability to concentrate on essential development functions such as expansion of physical infrastructures, streamlining the resource distribution system, and implementation of poverty reduction programmes. The current economic situation suggests that there is a need to allocate more resources to develop physical infrastructure and increase people's access to basic services.

Nepal has the lowest coverage of infrastructure facilities among the South Asian countries. As indicated by the Global Competitiveness Report 2008/09, of the 134 countries, Nepal ranked at 130 compared with Pakistan (62), India (90), Sri Lanka (101) and Bangladesh (121). This has major implications in terms of economic growth and social prosperity.

Being one of the poorest and most vulnerable countries, Nepal will suffer the most from climate change. The imperative therefore is intensive effort to include climate change adaptation at the heart of national planning which is now reflected in the TYP Approach Paper of the Government. Nepal will have to bear huge burden of accumulated and additional costs in adapting to climate change if actions are not taken immediately.

There is a greater understanding that LDCs with fragile economy and ecosystem needs additional funding to tackle adverse impacts of climate change. Nepal's understanding is that this funding is in addition to existing international aid commitment because the cost of climate change was not factored in when aid commitments were made to help developing countries in meeting the Millennium Development Goals (MDGs). It is equally important not to divert money from away pledges already made to Nepal, such as for education, health, water and infrastructure.

As Nepal's adaptation framework is set largely within the country's national development framework, there are a number of lessons emerging from experiences in implementing development objectives that will be relevant for implementing adaptation. The issues and challenges lies in integrating and mainstreaming climate change in the development process and its harmonization within the national policy and operational framework.

Major barriers to achieving sustained poverty reduction pertain to factors related largely to nonexistence of elected local bodies; performance not achieved as desired from bilateral and regional trade agreements and donor assistance; slow growth of revenue streams and high recurrent expenditure; and limited delivery of development related services.

In addition to these macro-level barriers, the Stocktaking and Stakeholders Consultation carried out for the preparation of Nepal's Second National Communication to the UNFCCC identified critical problems in relation to adaptation activities. These include inadequate financial, technological and human resources.

Specific to the thematic areas, barriers in the forestry sector (and potentially applicable to other sectors), include inadequate implementation of existing plans and policies (MoEST, 2008). Similarly, although agriculture has been given highest priority in the poverty reduction strategy, budget allocations to this sector and irrigation have decreased. In the context of irrigation, the large irrigation schemes have not been effective enough to provide irrigation facility as intended due to technical and other management related problems. In the health sector, barriers to achieving identified results have been attributed to the lack of clear guidelines pertaining to mandates and roles of devolved structures. In the context of urban settlements and climate induced disasters a number of factors that undermine effective adaptation were identified during the NAPA process. These include lack of public awareness on climate-related disasters and limited reach of early warning systems, lack of land use planning and limited implementation of building codes.

5.3 Priority project profiles

The nine combined profiles are presented below.

Combined profile 1

Title: Promoting Community-based Adaptation through Integrated Management of Agriculture, Water, Forest and Biodiversity Sector

Project Rationale

Climate change is a cross-cutting issue by virtue of its nature and impacts. In Nepal, the major impact of climate change on the vulnerable communities is the deterioration of livelihoods options and natural safety net. The potential impact of climate change can have adverse, detrimental and multiplier effects to ecosystem conservation, natural resource management, and food and water security. At the same time, due to the country's rugged terrain and scattered settlements at different elevations from north to south, upstream-downstream linkage is very crucial as far as climate adaptation is concerned. This also demands an integrated approach to ecosystem management and adaptation. Therefore Nepal's NAPA envisions establishing a set of adaptation measures at watershed and landscape levels and enhancing capacity of the vulnerable community through better access to technology, innovative knowledge and practices. The rationale for the proposed project is outlined below:

i. Climate change impacts are cross-cutting in nature and sectoral impacts are interlinked.
ii. Climate change impacts are more severe to the poor and marginal communities residing in vulnerable and critical watershed areas
iii. Nepal's rural livelihoods are based on the socio-natural interface and strengthening this interrelationship is necessary
iv. Community's resilience is low because of reduced livelihoods options and collective threat to their natural capital
v. Integrated approach to build community resilience can develop collective effort to minimize adverse impacts of climate change
vi. In Nepal, due to its geography, people's upward- downward movement (north to south) and strengthening the upstream-downstream linkage is indispensable

Description

As the proposed project is integrated and cross-cutting in nature, it has some vital components that have direct impacts on rural livelihoods and natural and social capital. The project components are:

i. Watershed management in Churia to ensure ecosystem and community resilience to climate change and promotion and scaling-up of Multi Use System (MUS) for the benefit of poor and vulnerable households
ii. On-farm soil and water conservation initiatives to support hill and mountain communities vulnerable to climate change and increase income from off-farm livelihoods
iii. Flood management to increase the resilience of communities
iv. Conservation of natural and social heritage in the high mountains

Goal

The overall goal of the proposed project is to increase community's resilience in order to enable them to better adapt to climate change by creating livelihoods opportunities through integrated resource management at watershed level.

Objectives

1) To produce and provide technology, skills and services for increased production and productivity of natural and human capital;
2) To promote sustainable farming practices including on-farm soil and water conservation initiatives for increased productivity and off-farm livelihood support;
3) To promote community based disaster risk reduction schemes for managing natural floods in the low land and landslides in the hills; and
4) To diversify livelihood options and income through better management of water, energy, forest and biodiversity.

Activities

i. Adaptation needs assessment at the basin region and local level (village development committee and district development committee level adaptation plans)
ii. Capacity building of stakeholders and communities within and around project area (including institutional strengthening and coordination)
iii. Sectoral plan development for each component with the involvement of local stakeholders
iv. Mobilization of community-based organizations and local communities for implementation of local adaptation plans
v. Installation of required structures for disaster risk reduction (e.g. early warning system, community-based disaster risk reduction plan preparation and implementation)
vi. Sustainable soil and water management (organic farming, community biodiversity management, integrated pest management, irrigation facility)
vii. Efficient water management (water harvesting schemes, multi use water system and technologies e.g. drip irrigation)
viii. Sustainable forest and resource management (community fire control, non-timber forest products management)
ix. Natural and social heritage conservation through community mobilization
x. Food security programmes implementation (promoting local technology and innovations)

Short term outputs

i. Food security of vulnerable people and communities enhanced by using climate resilient options
ii. Resource-use efficient options widely adopted for on-farm and off-farm income generation
iii. Community sensitized about climate change adaptation through public awareness raising
iv. Community adaptive capacity and decision making power enhanced

v. Resource management on a sustainable manner with focus on watershed and water conservation
vi. Community led disaster management initiated
vii. Climate resilient soil and water conservation measures availed for wider adoption
viii. Integrated short term and long term adaptation plans and vision prepared
ix. National and local capacity strengthened to develop climate resilient community
x. Climate friendly infrastructures developed
xi. Community-driven climate change adaptation projects implemented in demonstration sites

Potential long term outcomes

i. Food sufficiency for poor, marginalized, and disadvantaged farmers in water stressed areas attained
ii. Climate-induced disaster resilient communities developed within the project area and demonstration effects to other areas observed.
iii. Climate adaptation modality involving public and private sector developed
iv. Livelihoods of the climate vulnerable including local poor and indigenous communities improved by increasing income from natural resource-based employments (green jobs)
v. Water conservation for dry season to be used for different purposes availed
vi. Climate adaptation in development plans and programmes integrated and mainstreamed
vii. Government led and donor, civil society, private sector and local communities supported adaptation actions more harmonized and coordinated

Implementation

The Ministry of Environment will coordinate the overall delivery of the project but the sectoral agencies i.e. appropriate levels of the Ministry of Agriculture and Cooperatives, Ministry of Local Development, Ministry of Forests and Soil Conservation, Ministry of Home Affairs, and Ministry of Energy will be taking the lead in the implementation of the project in specific sites consistent with the Implementation Framework described in Section 3.4.

Time Frame: Five years

The Project is divided into two phases.
Phase I: Project set up and strengthening capacity of project partners and stakeholders (1.5 year)
Phase II: Project implementation (3.5 years)

Estimated total cost: USD 50.0 Million

Risk and Barriers

i. Political instability and weak coordination mechanism at local level
ii. Access to technology and financial resources to deliver the urgent and immediate priorities
iii. Delay in implementation will increase the project cost due to increased vulnerabilities

Monitoring and Evaluation

Monitoring and evaluation will be done in line with the Implementation Framework (see Section 3.4)

Combined profile 2

Title: Building and Enhancing Adaptive Capacity of Vulnerable Communities Through Improved System and Access to Services Related to Agricultural Development

Project Rationale

Most of the rural communities are dependent upon agricultural production for food security and livelihoods. Agriculture in both irrigated and rainfed areas are dependent upon favorable climatic conditions. The changes in temperatures and rainfall are leading to increased crop failure, pasture shortages and possibly increased incidence of pests, diseases and parasites. The agricultural development strategies and policies need to address current impacts and future climatic risk to make the governance and delivery mechanism more robust and climate smart.

Description

The nature of the project is to enhance the adaptive capacity of the vulnerable communities by improving access to inputs and services that are required for agricultural development. The project components are:

i. Capacity development of extension and advisory services
ii. Technology provision that enables adaptation to increased droughts and erratic rains
iii. Provision of finance and communications, transport and trading arrangements
iv. Identification and provision of plant and animal genetic resources that have highly climate adaptive characteristics – drought tolerance, resistance to flooding, shorter growing seasons, heat tolerance, etc.
v. Enabling policy and legal provisions to support community-based adaptation initiatives and implementation of local adaptation plans.

Goal

The overall goal of this integrated project is to develop the climate change adaptation capacity of vulnerable farmer communities by developing climate resilient agricultural practices.

Objectives

1) To promote the technologies on crops and livestock that can address climatic risks and uncertainty.
2) To improve the of vulnerable communities to modern agricultural technologies and services
3) To enhance the adaptive capacity of poor communities

Activities

Adaptation in agriculture can be supported through provision of robust and efficient extension services and appropriate technologies, market incentives, linkages between agro-ecosystems that allow specialization and buffering, and the provision of quality production inputs.

The activities proposed to support adaptation in agriculture are:

i. Enabling climate vulnerable communities to sustain their livelihoods by improving access to basic agricultural services, technology and practices (on-farm agro-biodiversity management, integrated pest management, home garden promotion, farmers field school)
ii. Enhancing community climate adaptive capacity through improved production and marketing systems (collective marketing)
iii. Strengthening of highland-lowland linkages to improve community access to goods and services
iv. Promoting crop varieties and animal breeds adaptable to climatic risk and uncertainty
v. Strengthening the governance mechanism from local to national level through robust legal policies, strategies, institutional mechanism and financial resources.
vi. Strengthening mechanism to increase access of most vulnerable communities to agriculture system (strengthening poor farmers institutions, saving and credit schemes, farmers decision making through farmers' groups, etc)

Short-term outputs

i. Climate smart agricultural extension and advisory related services strengthened
ii. The need for climate adaptive technologies addressed by public and private sector supply chain actors
iii. Knowledge and information, resources and products exchanges and trading between highland and lowland areas enhanced
iv. Support to implement local adaptation plan of action increased
v. Use of climate adaptive crop varieties and livestock breeds increased

Potential long-term outcomes

i. Wide-scale changes in agricultural production and marketing practices that enable adaptation to climate change effects observed
ii. Agriculture-based rural livelihoods based in climate change vulnerable areas sustained

Implementation

The Ministry of Agriculture and Cooperatives (MoAC) will lead the project. Agricultural research and development organizations will be involved in assessing adaptation needs and developing the technological packages for adaptation. MoAC and MoE/Department of Hydrology and Meteorology, and other knowledge-based organizations will be involved in the delivery of an integrated package of agricultural extension, climate information, and technology management District Development Committees and Village Development Committees will facilitate the inclusion of project plans into their annual plan. Private sector and civil society will be involved in extension, technical inputs and service delivery. Farmers' cooperatives and agricultural producer groups are main stakeholders at local level.

Timeframe*:* Five years

Estimated total cost: USD 44 million

Risks and barriers

i. Low resolution climate change projections upon which to base assessment of adaptation needs and adaptive technology selection
ii. Mainstreaming climate change into organizational operations may be difficult to achieve
iii. Costs of adaptive technologies may prohibit adoption
iv. Farmers lack investment resources to enable adaptation

Monitoring and Evaluation

- Baseline information and data generation in terms of agricultural technologies and practices
- Monitoring through assessment of adoption rates of adaptive technologies and business development of private sector providers
- Evaluation by independent team of experts

Combined profile 3

Title: Community-based Disaster Management for Facilitating Climate Adaptation

Project Rationale

Observations of the effects of increased climatic variability in some parts of Nepal show increasing erratic and intense rains. This climatic trend combined with fragile landscape, deforestation and eroded soils are leading to landslides and flash flooding hazards. It is projected that rainfall intensity will increase across many areas of Nepal with climate change. Vulnerable communities will have to increase adaptive capacity to cope with climatic hazards.

These hazards also affect the availability of water resources particularly for household use. Water supplies need to be managed so they are climate proofed. Studies show that communities recover most quickly from climate-induced disasters such as flash flooding if drinking water supplies are reliable and accessible before and after disasters.

Description

The nature of this project is to managing disasters at the community levels in order to facilitate the climate adaptation. The project components are:

i. Capacity development for adapting climatic hazards and reducing disaster-related risks
ii. Development of infrastructures to minimize the hazards and risks
iii. Development of safety-nets and basic services

Goal

The overall goal of this project is to manage climatic hazards at the community level through enhancing their adaptive capacity.

Objectives

1. To build the capacity of communities to adapt to a changing climate
2. To conserve domestic water sources and management of climate-induced disasters.
3. To protect the communities from climate-induced disasters

Activities

The project activities will focus on facilitating climate risk management to ensure that basic water sources are protected in order to facilitate community based adaptation. The adaptation activities identified as most important are:

i. Building capacity to enhance community adaptation to climatic hazards (e.g. drying of natural water sources)
ii. Construction of water retaining structures to address the effect of climate change
iii. Establish, rehabilitate, and conserve small scale drinking water supply schemes and traditional water sources
iv. Community-based climate-induced disaster risk reduction mechanism developed to protect safety nets and basic services

Short-term outputs

i. Vulnerable communities better aware of climate induced disaster risks
ii. Communities trained in disaster risk reduction practices and well equipped with local adaptation plans
iii. Communities better protected from climate-induced disasters
iv. Climate proofed water supplies developed

Potential long-term outcomes

i. Losses of property and life due to climate induced disasters reduced
ii. Community action of sustainable climate induced- disaster risk reduction achieved

Implementation

The Ministry of Home Affairs will lead the project in collaboration with Ministry of Irrigation and Ministry of Physical Planning and Works. Construction companies will also participate to elaborate water retention structures. Disaster risk reduction professionals from private sector and civil society organizations will be also mobilized.

Timeframe: Six years

Estimated total cost*:* USD 60 million

Risks and barriers*:*

- Low resolution climate change projections upon which to base assessment of climate risks
- Mainstreaming climate change into key mandates and operations of organizations may be difficult to achieve
- The cost of water retention structures and climate proofing water supplies may prohibit wide-scale construction
- Communities unable to mobilize to implement disaster risk reduction procedures

Monitoring and evaluation

- Baseline information generation in terms of disaster hazard exposure and occurrence
- Monitoring through assessment of the effectiveness of water retention structures and sustainability of water supplies during climate hazard–related events
- Evaluation by independent team of experts commissioned by lead ministries

Combined profile 4

Title: GLOF Monitoring and Disaster Risk Reduction

Project Rationale:
In Nepal according to available data resources, temperature increase is higher in Himalayan regions compared to other regions. The increase of temperature will increase the rate of snow melting. Due to the weak natural dams there is a risk that can lead to GLOF events. Nepal has already experienced a number of GLOF events. If mitigation and disaster risk reduction activities are not in place, the country will suffer more from these events.

Description
The project is focused on the monitoring of GLOF events so as to reduce the possible disaster risks. The project components are:

i. Glacial lakes monitoring to reduce potential hazards
ii. Development of appropriate structure and early warning systems to support the livelihoods of downstream communities

Goal
The overall goal of this project is to contribute to the reduction of GLOF risk and enhance the sustainability of environmental services from the Himalayas.

Objectives

1. To monitor critical glacial lakes and identify GLOF-vulnerable communities and work with them to reduce risk
2. To provide alternative livelihoods to GLOF-vulnerable communities
3. To develop climate proof infrastructure and support services in GLOF sensitive areas.
4. To reduce the chances of loss of lives and properties due to GLOF

Activities

i. Monitoring of the potential glacial lakes (emphasis on the six major GLOF potential lakes)
ii. Implementation of structural measures for the GLOF reduction
iii. Implementation of disaster risk reduction activities (establishment of early warning systems, forecasting and preparedness in downstream communities)
iv. Support to GLOF-vulnerable communities through creating alternative livelihoods opportunities (agriculture and forest based livelihood, alternative energy)

Short-term outputs

i. Hazard/risk mapping of the GLOF potential areas achieved
ii. Information about the conditions of the GLOF potential lakes generated
iii. Downstream communities in disaster preparedness and risk reduction activities involved

Long-term outcome
Downstream communities realize less adverse impacts from the GLOFs due to rising temperature

Implementation
The Ministry of Environment will lead the project with the involvement of other relevant line ministries and implementing partners

Timeframe: Five years

Estimated total cost: USD 55 million

Risk and Barrier:
Delay in implementation due to the existing situation and inadequate funding

Monitoring and Evaluation:
The monitoring of the activities will be carried out by the lead ministry in collaboration with the implementing partners. The evaluation will be done by a team of experts commissioned by MoE.

Combined profile 5

Title: Forest and Ecosystem Management for Supporting Climate-led Adaptation Innovations

Project Rationale

Increased climatic variability is resulting in reduced precipitation during the winter and dry seasons. Rising temperature, glacial retreat and changes in water availability will also lead to changes in biodiversity. The influence can be seen in the timing of seasonal events (e.g. flowering, migration) in rates of growth and reproduction and in the distribution of species.

Forest fire intensity and occurrence has increased in recent years. Forest fire not only burns the fuel in forest floor and forest biomass, but also destroys habitat for many wild species such as insects, birds and wild animals. Another cause of loss of forest ecosystem is massive deforestation. Deforestation and indiscriminate use of trees for fuelwood are reducing the energy security of the rural poor. Better management of trees whether within forests, plantations or on agricultural lands is required to improve biomass energy availability. It is also important to harness economic benefits of sustainable forest management (linking to market and attracting carbon financing) for supporting the livelihood of millions of communities dependent on these natural resources.

Description

The project is concerned with managing the forest and the ecosystem in order to promote innovations for climate-led adaptations. The project components are:

i. Capacity development of forest dependent communities, farmers and rural population
ii. Assessment of potential sites for tree plantations and investments in community managed plantation
iii. Generation of biomass energy and related technologies
iv. Research and extension of adaptation priorities

Goal

The overall goal of this project is to develop community-based innovations to adapt with changing climate and conserve ecosystem services.

Objectives

1. To develop community capacity to mitigate forest fire occurrences and self sustained forest produces
2. To support in implementing adaptation priorities in the local level
3. To scale-up technologies and strengthening the local institutions

Activities

i. Community-based forest fire management implementation in the mid hills and Terai
ii. Management of trees outside the forests in public and private land (agro-forestry practices)
iii. Plantations to maintain the balance between fuel wood demand and supply for rural household energy
iv. Scale-up of biomass energy technologies (quantity, quality, and coverage) for less fuel wood consumption
v. Strengthening local level forest institutions and their governance
vi. Supporting the implementation of adaptation priorities of community forestry user groups
vii. Facilitating market linkages and voluntary carbon financing

Short-term outputs

i. Vulnerable communities become more aware of fire hazard and better able to manage forest fire events
ii. Vulnerable communities have access to adaptation technologies and practices
iii. Farmers trained in agro-forestry practices
iv. Community forestry user groups sensitized on economic and carbon financing potentials
v. Rural population become more aware of sustainable biomass energy technologies
vi. User groups' capacity enhanced for forest fire management.

Potential long-term outcomes

i. Natural forest better managed by communities and protected from forest fires
ii. Loss of natural resource base due to forest fires reduced
iii. Peoples' access to biomass energy in rural areas improved
iv. Use of sustainable biomass energy technologies increased
v. Additional employment created from management of forest goods and services

Implementation

The Ministry of Forests and Soil Conservation (MoFSC) will lead the project in partnership with other relevant organizations.

Timeframe: Three years

Estimated total cost: USD 25 million

Risks and barriers

i. Inadequate fire risk assessments
ii. Mainstreaming climate change into organizational mandates and operations may be difficult to achieve
iii. Cost of agro-forestry and sustainable biomass energy technologies may prohibit wide-scale use

Monitoring and evaluation:

- Baseline information generation in terms of fire events occurrence
- Monitoring through assessment of the effectiveness of fire risk management
- Extent of adoption and use of biomass energy
- Evaluation by independent team of experts commissioned by the MoFSC

Combined profile 6

Title: Adapting to Climate Challenges in Public Health

Project Rationale

Extreme events are expected to become more frequent as a result of climate change. Climate extremes can have devastating effects on human health and society. In Nepal, historical information reveals that disasters, famines, and disease outbreaks have been triggered by droughts and floods. From 1954 to 2002, floods have affected over a million people in Nepal. The indirect impacts of climate change and variability include increases in vector-borne diseases (malaria, kala-azar, dengue, viral encephalitis, flariasis) and water and food-borne diseases (diarrhea, dysentery, typhoid).

Despite the fact that projected changes in temperature and rainfall will almost certainly alter relative magnitudes of hydrological cycle, the country lacks a reliable climate early warning system and basic infrastructure to reduce the impacts of extreme weather events. The health sector should have sufficient database, a strategically focused programme and policy to combat with adverse impact of climate change on public health. An integrated approach must be adopted for health planning and research in different climatic regions of the country

Description

The project focuses on the climate change adaptation in the public health sector of Nepal. The major components are:

i. Mapping of major communicable diseases and water and food-borne diseases
ii. Exploring indigenous knowledge and community practices for health adaptation appropriate for different ecological regions
iii. Strengthening Hospital Management Information System (HMIS) and early warning system
iv. Capacity building in public health for climate adaptation

Goal

The overall goal of this project is to support adaptation planning in the health sector by generating evidence of the linkages between climate change and public health

Objectives

1. To reduce the impacts of climate change on public health through research and development programmes
2. To strengthen institutions through provisions of logistics and related support services
3. To enhance the capacity of service providers and communities

Activities

i. Reduce public health impacts of climate change in Nepal through evidence-based research and piloting
ii. Community empowerment and public education for responding adverse effects of climate change in public health
iii. Disease outbreak investigation and emergency response
iv. Programme to scale up control of vector, water and food-borne diseases
v. Strengthening forecasting/early warning systems on climate change and health
vi. Integrated surveillance of vector and vector-borne diseases
vii. Logistics support to Rapid Response Team (RRT) such as provision of essential drugs, medical supplies and equipments
viii. Expansion of vector-borne control programme from 26 districts to all districts.
ix. Formation of 300 Rapid Response Teams at sub district level and mobilization of teams to the field

Short-term outputs

i. Staff trained to operate and maintain advanced public health and early warning system
ii. A functional early warning system in place
iii. Greater awareness of the end users created regarding relevance and importance of weather information
iv. Two way communication system between local health facilities and surveillance system established
v. Hospital Management information System (HMIS) system in central, zonal and district hospitals strengthened
vi. Vector-borne disease programme expanded

Potential long-term outcomes

i. Operational data collection networks strengthened and made responsive to user's needs
ii. Climate information in the national public health planning process integrated
iii. Quality dataset for climate change developed
iv. Population protected from adverse impacts of climate change on public health.

Implementation

The Ministry of Health and Population will lead the project in collaboration with the Ministry of Environment, Ministry of Energy, Ministry of Agriculture and Cooperatives and Ministry of Local Development. The relevant NGOs, CBOs, and local communities will also be involved.

Timeframe: Three years

Estimated total cost: USD 15 million

Risks and barriers

i. Inadequate technical skills, human resources and financial capacity
ii. Unavailability of quality data on climate and health impacts, few meteorological station coverage, poor health surveillance system
iii. Inter-departmental coordination weak both among and within governmental ministries
iv. Inadequate fund allocated to research
v. Concrete methodology lacking for assessing the impacts of climate change on vulnerable populations

Monitoring and evaluation

District Health Office/District Public Health Office will be responsible for quarterly monitoring. Ministry of Health and Population will be responsible for mid-term and end of the project evaluation.

Combined profile 7

Title: Ecosystem Management for Climate Adaptation

Project Rationale

Climate variability is causing deleterious changes in key ecosystems such the high mountain rangelands and wetlands. These areas have high ecological value and also support livelihoods of poor people. The conservation of ecosystems is necessary in order to sustain the livelihoods of those dependent on the ecosystem. Adaptation of the ecosystem is hampered by inappropriate management and over exploitation of natural resources.

Description

The project focuses on the ecosystem conservation in order to support the livelihoods of the communities who are dependent on it. The project components are:

i. Promotion of improved pasture and range-land management techniques to rehabilitate degraded mountain ecological regions
ii. Conservation of medicinal plants and non-timber forest products (NTFP) in potential areas
iii. Integrated wetland management in Terai through innovative mechanisms like facilitating the governance of ecosystem services
iv. Landscape level corridor management in the Terai

Goal

The overall goal of this project is to conserve the ecosystem and promote the ecosystem-based livelihoods of the people living in the Western Nepal.

Objectives

i. To rehabilitate the degraded areas through promotion of improved pasture and range-land management techniques
ii. To conserve and utilize local ecological resources for livelihood support
iii. To enhance the capacity of local communities for sustainable management of resources

Activities

i. Develop and support implementation of Local Adaptation Plans (focused on conservation and management) for high mountain and wetland through user groups
ii. Study the impacts of changes in precipitation and temperature on pastures, herbs and NTFP management
iii. Train local communities in management of the selected climate sensitive natural resources
iv. Implementation of management plan for forest and habitat management, including control of invasive species, promoting indigenous species, income generating activities to local communities from wetland resources.
v. Monitoring the impact of climate change in indicator species.
vi. Prepare and implement eco-tourism promotion plan.
vii. Study and documentation of indigenous wetland conservation knowledge, skills and practices.
viii. Promotion of livelihood opportunities from high mountain and wetland resources
ix. Identify and implement legal measures to enable management of high mountains and wetlands and maintain upstream and downstream linkages.

Short-term outputs

i. Local communities better able to manage high mountain and wetlands for biodiversity conservation
ii. Improved management of important ecosystems
iii. Local communities able to conserve medicinal plants and NTFPs from adverse impacts of climate change
iv. Sustainable management of forest resources thereby contributing to additional biomass generation or climate change mitigation.
v. Improved communication and coordination between upstream and downstream communities including service providers

Potential long-term outcomes

i. High mountain and wetland ecosystems conserved and better able to adapt to climate change
ii. Livelihoods of those dependent upon the ecosystems sustained

Implementation

The Ministry of Forests and Soil Conservation (MoFSC) will lead the project and will work in collaboration with the Ministry of Environment, Ministry of Agriculture and Cooperatives, and Ministry of Local Development. In the districts, there will be project team attached to concerned district office under MoFSC. Local communities will also be involved in the project implementation.

Timeframe: Three years

Estimated total cost: USD 31 million

Risk and barrier

i. Insufficient and weak coordination among local communities, and related line agencies at different levels may affect in attaining the project's output and outcome.

Monitoring and evaluation

The central level project coordination committee will guide the implementation mechanism of the project. A mechanism for smooth implementation of the project in districts will be established through activity implementation committee, which will take place once in every month. The committee will be represented by appropriate organizations working in districts under MoFSC, local government and appropriate community-based organizations.

Combined profile 8

Title: Empowering Vulnerable Communities through Sustainable Management of Water Resource and Clean Energy Supply

Project Rationale

Climate change effects will be mediated through the introduction of appropriate adaptation measures. Hence water resources and energy supply systems need to be adapted to cope with both too much and too little water in all seasons.

Nepal has been already facing water scarcity due to changes in climatic trends. Adaptation activities designed early will not only be cost effective but also provide opportunity to increase adaptive capacity of the local communities through efficient water and energy supply. This includes investment in efficient water resource management and clean and low carbon energy technologies.

Description

The project is the nature of sustainable management of water resources and supply of clean energy to empower vulnerable people. The project components are:

i. Conservation of water sources and their sustainable management
ii. Development of institutional and physical infrastructures for the efficient utilization of water (including rain water)
iii. Promotion of sustainable clean energy supply

Goal

The overall goal of this project is sustainable management of water resources and supply of clean energy.

Objectives

i. To manage water resources and supplies using a combination of climate proofing, climate risk management, and water use technologies.
ii. To ensure the sustainable supply of clean energy through developing related technologies and schemes
iii. To develop/enforce regulatory mechanism for sustainable harvesting of water resources
iv. To enhance the capacity of the institutions and related stakeholders

Activities

i. Conservation of lakes supplying water and ecological services to urban areas
ii. Water supply source conservation and strengthening programmes of existing projects affected by source reduction
iii. Piloting rain water harvesting structures
iv. Promoting clean and low carbon energy technologies (small micro hydro, solar, biogas, solar power)
v. Financial analysis and economic appraisal of existing innovative water and energy schemes and practices
vi. Development of nationwide urban groundwater monitoring system and enactment of regulatory measures
vii. Establishment and improvement of micro-hydropower projects being affected by the acute water shortages
viii. Improve water mills for multi-use
ix. Facilitate the implementation of local adaptation plans for efficient water and energy management

Short-term outputs

i. Urban water sources adaptive management plans including lake conservation developed and implemented
ii. Appropriate water harvesting techniques promoted
iii. Pilot urban groundwater monitoring systems in place for key urban centers
iv. Regulatory framework to improve management of water resources and supply systems amended/developed
v. Access to clean and low carbon energy for vulnerable households improved
vi. Methods for climate proofing micro-hydro plants and water mills developed, tested and used

Potential long-term outcomes

i. Urban water sources managed to overcome climate change challenges
ii. Key lakes conserved
iii. Widespread adoption of water harvesting techniques
iv. Urban groundwater monitored and information used for improved adaptive management
v. Regulatory framework for management of water resources and supply systems amended
vi. Climate proofed micro-hydro plants and water mills promoted
vii. Sustainable clean energy and low carbon investments at national level achieved

Implementation

The Ministry of Environment will lead the project in collaboration with Ministry of Energy. Water professionals and the private sector companies that offer climate proofed water harvesting, micro-hydro and water mills technologies will also be involved. Water user groups will also be involved in promoting technology adoption

Timeframe: Three years

Estimated total cost: USD 40 million

Risks and barriers

i. Inadequate climate change projection information upon which to base assessment of climate effects on water sources
ii. Mainstreaming climate change adaptation into key organizations may be difficult to achieve
ii. Costs of climate proofing micro-hydro and water mills may prohibit its wide-scale adoption
iii. Reluctance to adopt water harvesting technologies

Monitoring and evaluation

- Baseline information generation in terms of water source status, functionality of micro-hydro plants and water mills, and water harvesting technology use
- Monitoring through assessment of the effectiveness of adaptive management of water sources and functionality of micro-hydro plants and water mills, and water harvesting technology use
- Evaluation by independent team of experts commissioned by Ministry of Environment and Ministry of Energy

Combined profile 9

Title: Promoting Climate Smart Urban Settlement

Project Rationale

Climate change impact on urban areas are likely to be severe particularly in terms of increased exposure to flooding, disturbance to water sources, and need for increased energy consumption for cooling.

The unsafe built form in urban settlements in Nepal is one of the major reasons for vulnerability. Physical changes within municipalities in Nepal can be observed as land use changes, new built forms, and land fragmentations. In some areas, the new structures are built by untrained local contractors without adjusting designs and construction for impacts of climate changes. Most construction works are carried out with minimal considerations of building codes and monitoring.

Description

The project is focused on the development and promotion of climate smart urban settlement in Nepal. The project components are:

i. Enforcement of building codes in municipal areas
ii. Management of municipal waste
iii. Capacity building of institutions and communities in planning and management

Goal

The overall goal of this project is to promote climate smart urbanization process in Nepal through national and local capacity building.

Objectives

1. To develop mechanism for incorporating climate change dimensions in the building codes
2. To manage and utilize the municipal waste and link it with clean development mechanism
3. To enhance the capacity of the related stakeholders and institutions

Activities

i. Incorporate climate change considerations in building codes in municipal areas
ii. Enforce building codes
iii. Identification of vulnerable communities that require rehabilitation and rehabilitate them
iv. Establish municipal compost plants and develop strategy to link with Clean Development Mechanism (CDM) in order to generate additional revenue and as co-benefits to adaptation
v. Strengthen capacity of local level institutions for efficient water and energy planning and project implementation
vi. Facilitating in developing and implementing low carbon development strategies (piloting in urban areas and scaling in country side)
vii. Awareness raising and information dissemination through print and electronic media
viii. Training to municipal engineers, and contractors

Short-term outputs

i. Better awareness about building codes in municipal areas
ii. Building codes revised to incorporate climate change dimensions
iii. Most climate vulnerable communities identified and plans for rehabilitation developed
iv. Municipal compost plants developed and operated
v. Local organizations aware of and able to carry out more efficient water and energy planning and project implementation
vi. Low carbon development and clean energy promotion strategies adopted

Potential long-term outcomes

i. Building codes adjusted for climate change effects
ii. Most climate vulnerable communities rehabilitated
iii. Municipal compost plants well-functioning and CDM related revenue generated
iv. Local organizations implementing efficient water and energy activities
v. Improved access to financial resources to support low carbon energy and water use management schemes

Implementation

The Ministry of Physical Planning and Works will lead the project. The municipal authorities, private sector construction companies and local urban peoples' organizations managing projects will also be involved.

Timeframe: Three years

Estimated total cost*:* USD 30 million

Risks and barriers

i. Costs of rehabilitation of communities may be high
ii. Construction business intransigence to accept and follow building codes

Monitoring and evaluation

- Baseline information generation based on current adherence to building codes and incidence of urban communities affected by climate induced hazards
- Monitoring of adherence to building codes by new builds and plans
- Monitoring of climate-induced damage and loss of homes
- Evaluation by independent team of experts commissioned by the lead ministry.

CHAPTER 6
CONCLUSIONS AND THE WAY FORWARD

The Nepal NAPA is a process beyond just report preparation. This process now moves to the implementation of the identified priorities. The NAPA document has clearly set out the Government of Nepal's priorities for adaptation action. All support to adaptation activities in Nepal now has a coherent basis of prioritization as set in this report.

The Nepal NAPA process benefited NAPA experiences elsewhere and having available greater support from development partners, in addition to the Least Developed Countries Fund (LDCF).

The process has also had the advantage of being able to convene wide involvement – both from the government and non-governmental stakeholders. The Ministry of Environment hosted the NAPA team and provided necessary coordination and guidance to prepare NAPA document. The wider ranges of consultations with the stakeholders and potential beneficiaries throughout the country have enriched the NAPA process that contributed the process to be more inclusive and country-driven.

During the preparation of NAPA, the Government of Nepal has adopted a Three-Year Plan (2010-2012). The Plan has broad-based objectives of making development activities climate-friendly, mitigating the adverse impacts of climate change, and promoting adaptation. It has contributed to adopt strategies, *inter alia*, for adapting with and conducting studies on climate change; and making meteorological forecast more reliable. In order to implement the strategies, the Plan has made the MoE responsible for coordinating all activities related to environment conservation and climate change, and NAPA implementation through national and international support.

Intensive work carried out at different levels has provided a basis for prioritizing adaptation actions across various sectors. These priorities would provide a basis and platform for the development of a national climate change adaptation response strategy and it is anticipated that funding will be available from diverse sources to implement these priorities.

Nepal considers NAPA as a solid foundation for the implementation of most urgent and immediate adaptation options. The Government of Nepal will make every effort to implement the NAPA prioritized adaptation actions effectively with enhanced participation of stakeholders and climate vulnerable people. It is envisioned that experience from NAPA implementation will further streamline adaptation actions including other climate change activities in Nepal.

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Annexes

Annex 1. Milestones in the preparation of the Nepal NAPA

Project Signed:	November 2008
Inception workshop:	May 2009
TWG formation:	September 2009
Induction workshop:	October 2009
Transect appraisal exercise for detailed vulnerability assessment:	November 2009
Writeshop:	December 2009
Synthesis workshop:	February 2010
Reference group consultation workshops	5-10 March 2010
Project prioritization criteria development (with MCA tool)	by 15th April 2010
Project prioritization and first draft of NAPA	End of May 2010
National and regional consultation on draft NAPA	June-July 2010
Final NAPA	September 2010
Follow up proposals development and submission	September 2010

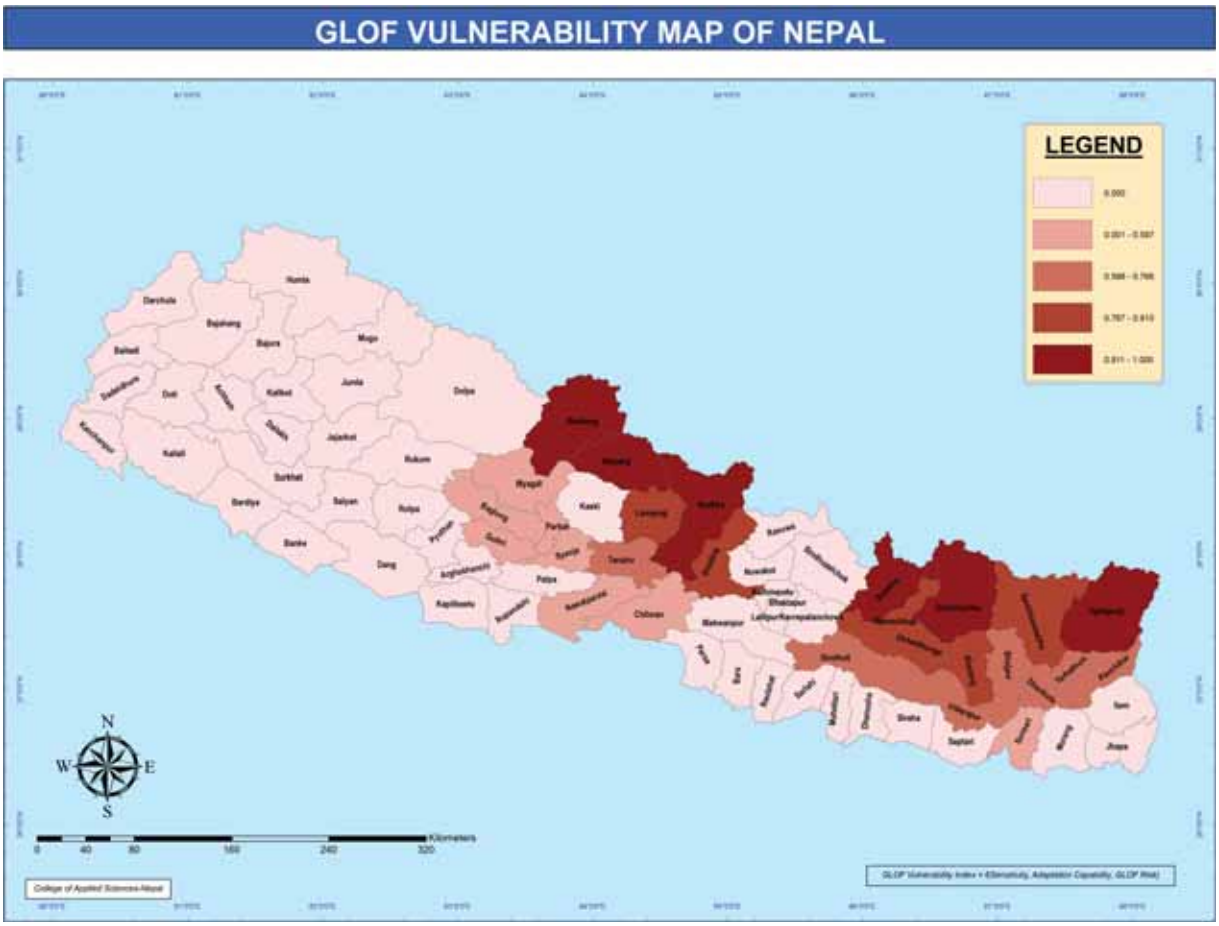
Annex 2. Perceptions of climatic hazards and climatic changes identified during the Transect Appraisal Exercises

West	Central	East
High Himalaya		
Changes in temperature Days are getting warmer and nights are less cold **Changes in precipitation** Rainfall: becoming erratic, delayed onset; reduced rainfall in the dry months; intense rainfall episodes in the monsoon; Snow: Decrease in snowfall; snowline has changed; Untimely and unusual snowfall; Increase trends of snowmelt Increase in extreme weather conditions Increased incidence of avalanche Changes in frost/hail patterns; Untimely tuwalo (heavy morning fog)	**Changes in temperature** Days are becoming hotter; maximum temperature last year was 24°C to 25°C now it is 27°C **Changes in precipitation** Rainfall: Increased variability in rainfall pattern; Delayed rainfall; Increase in high intensity episodes while total amount remaining the same; In recent years, more rainfall is experienced during the later stage of the monsoon Snowfall: Decreased amount; Shift in the timing of occurrence (e.g. in Mustang, snowfall occurs in late April); duration increased up to *Baishakh (mid-April to mid-May)-*; Changing to rainfall/hail stone with an increase in hailstorm events. **Changes in wind pattern** North wind used to blow only on specific periods, now it occurs throughout the year (from seasonal to annual changes)	**Changes in temperature** Increase in surface temperature; Days becoming hotter **Changes in precipitation** Rainfall: Increased variability: Rain is irregular and unpredictable; Shorter rainfall duration with intense rain spells; Shorter winter rainy season; Rainfall timing - Delay in the occurrence of monsoon rain (it used to start from *Baishak* or *Jestha* (May-June), now it starts from *Sharaban* (July to August); shorter west-to-east rainfall season; Decrease in cloudy days Snowfall: Shortened snowfall preiod **Change in wind Pattern** Stronger wind and erratic storm; western wind blows more than eastern wind Intensity of frost and dew shortened Lightning frequency increased
Mid Hills		
Changes in temperature Days are getting warmer; nights are less colder; rural areas (e.g. Dadeldhura) are getting warmer **Change in Precipitation** Rainfall: rainfall becoming erratic and unusual timing of rainfall is becoming common; delayed onset; reduced rainfall in the dry months; intense rainfall episodes in the monsoon Snowfall: Decrease in amount and duration of snowfall for the past 5 years **River Flow** Dry season water flow in west Rapati river has decreased last year from minimum record flow of 35 cubic m/sec to 31 cubic m/sec (Gopghat stream and gauging station) Increase in extreme weather conditions	**Changes in temperature** Increase in temperature; cold wave in the winter has increased **Change in Precipitation** Increase in erratic and high intensity rainfall episodes; **Change in wind and other weather patterns** Increase in wind intensity increased and timing changed Fog & *tuwalo* – duration of fog decreased (previously, fog is until 12 PM but now visibility starts by 10 AM); *tuwalo* pattern changed Hailstorm: changes in the period of hailstorm (previously hailstorms occur in March-April, now it has been delayed); changes in size and shape of hailstorms (previously their shapes are rounded, now their shapes are pointed)	**Changes in temperature** Increase in surface temperature; Number of hot days increasing **Changes in precipitation** Changing rainfall pattern: short intense spells of rainfall; delay in the onset of rainfall by as much as 2-3 months; rainfall season duration decreased Incidences of prolonged droughts **Change in wind and other weather patterns** Cloudy days decreased Stronger wind becoming more prevalent, very erratic Intensity and duration of frost and dew decreased Increased incidence of windstorm and hailstorm; hailstorm season has shifted Lightning episodes increased

West	Central	East
Terai		
Changes in Temperature Increase in temperature; extreme temperature events with extreme cold days and extreme hot days; increase in cold waves during winter; village is becoming warm (Sukhad) **Changes in precipitation** Shifts in rainy season: delayed onset - rainfall of Chaitra to Ashad (April to June) has now shifted to Bhadra/Ashoj (July/September); Decrease in rainfall amount with short intense rain spells (leading to occasional floods); Increased rainfall variability with unpredictable rainfall & reports of both increased and decreased duration **Change in Wind Pattern** Altered wind patterns – duration of western winds is longer	**Change in Temperature** Increase in temperature - days becoming increasingly hotter, while mornings are cooler; *Sitlahar* (coldwaves) duration has become longer - starts earlier and lasts for a longer time compared to the last 5-10 years **Changes in Precipitation** Rainfall pattern has become more erratic; high intensity but short duration **Change in wind pattern** Early occurrence of westerly winds. It used to blow only after January 15th, now it blows as early as October/November	**Change in Temperature**: Increase in temperature. **Changes in Precipitation** High intensity of rainfall in shorter period of time; decreased number of rainy days, however an increase in intense rainfall (year round rainfall remaining the same) Both foggy days and frost days disappeared **Change in wind Pattern** Hot winds have increased.

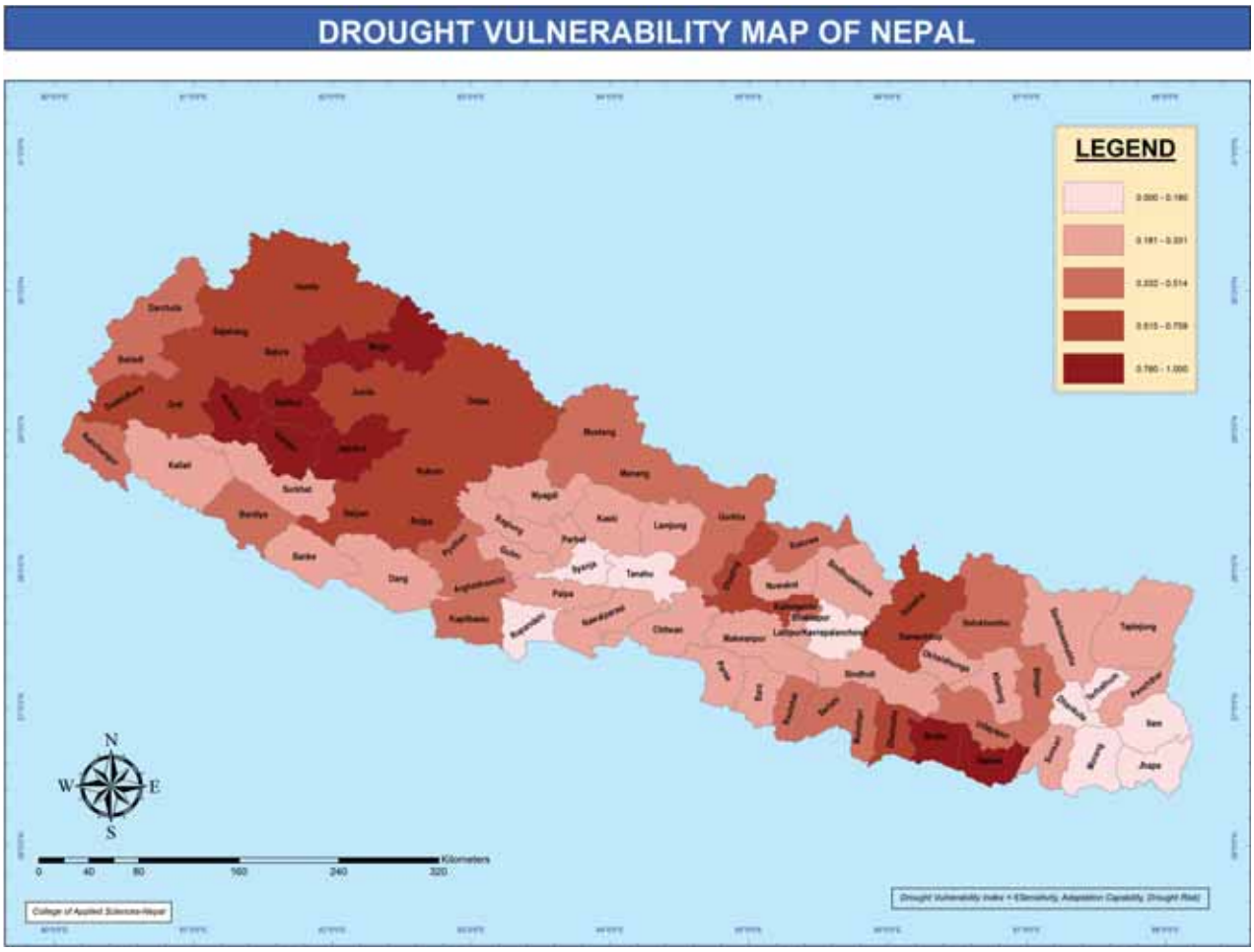
Annex 3. Key results of district-level climate change vulnerability assessment in Nepal

This annex draws information from the MoE/NAPA Project (2010) study "Climate change vulnerability mapping for Nepal." Maps and tables showing relative climate vulnerability related to GLOF, droughts, flooding and landslides for the 75 districts of Nepal are presented below. The map and table of overall district level relative climate vulnerability are presented in Section 2.1.



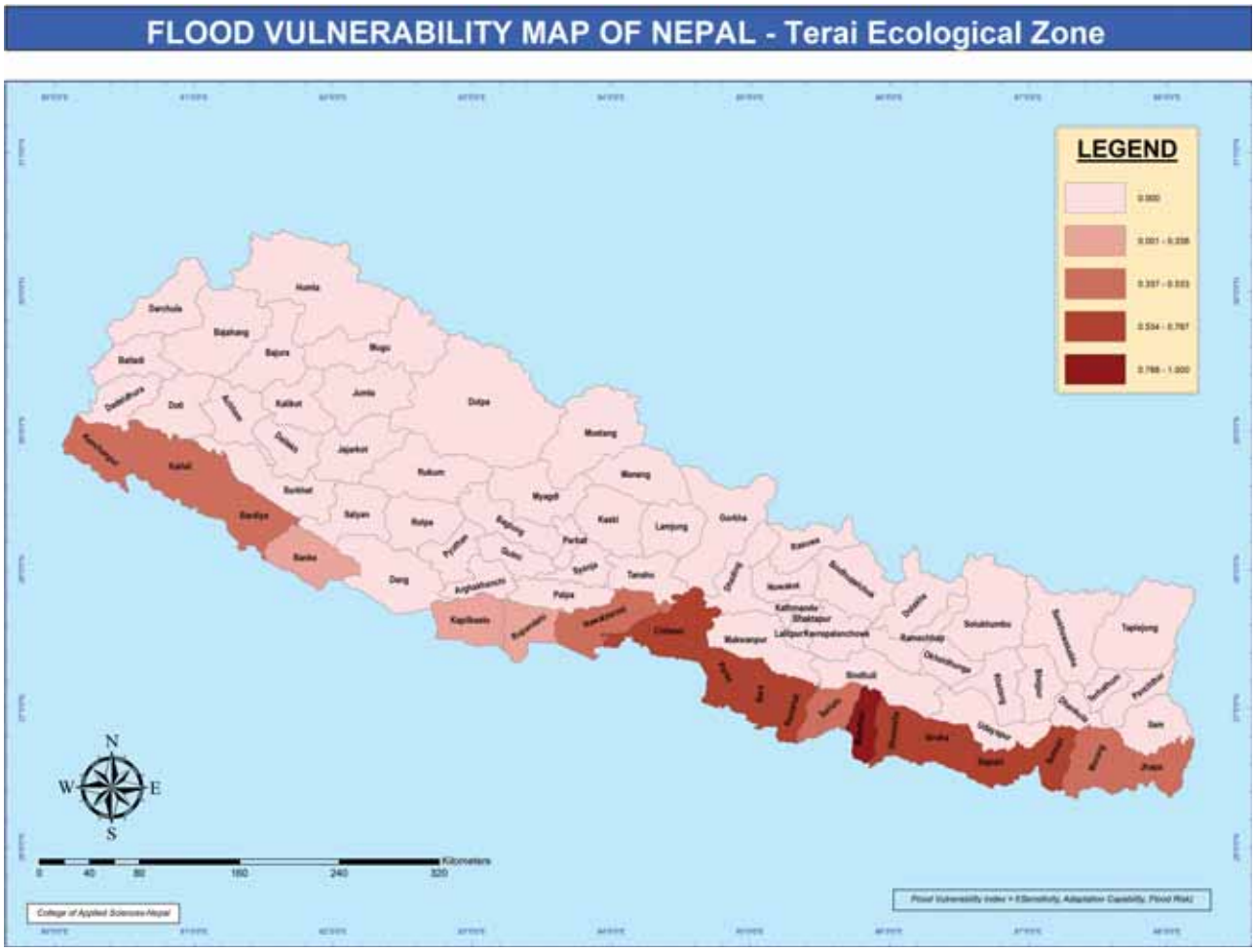
District ranking-GLOF Vulnerability Index

GLOF Vulnerability	Districts
Very High (0.911-1.000)	Dolakha, Solukhumbu, Manang, Mustang, Taplejung, Gorkha
High (0.767-0.910)	Khotang, Sankhuwasabha, Lamjung, Okhaldhunga, Ramechhap, Dhading
Moderate (0.598-0.766)	Bhojpur, Panchthar, Udayapur, Tanahu, Terhathum, Sindhuli, Dhankuta
Low (0.001-0.597)	Baglung, Chitwan, Parbat, Myagdi, Nawalparasi, Sunsari, Gulmi, Syangja
Very Low (0.000)	Jajarkot, Mugu, Kalikot, Dailekh, Saptari, Achham, Siraha, Dolpa, Humla, Kathmandu, Jumla, Dadeldhura, Bajura, Bajahang, Rukum, Salyan, Rolpa, Doti, Dhanusha, Baitadi, Sarlahi, Bardiya, Pyuthan, Rasuwa, Kanchanpur, Bhaktapur, Mahottari, Kapilbastu, Darchula, Rautahat, Arghakhanchi, Parsa, Dang, Banke, Kailali, Sindhupalchok, Lalitpur, Makwanpur, Nuwakot, Surkhet, Kaski, Palpa, Bara, Rupandehi, Kavrepalanchowk, Ilam, Morang, Jhapa



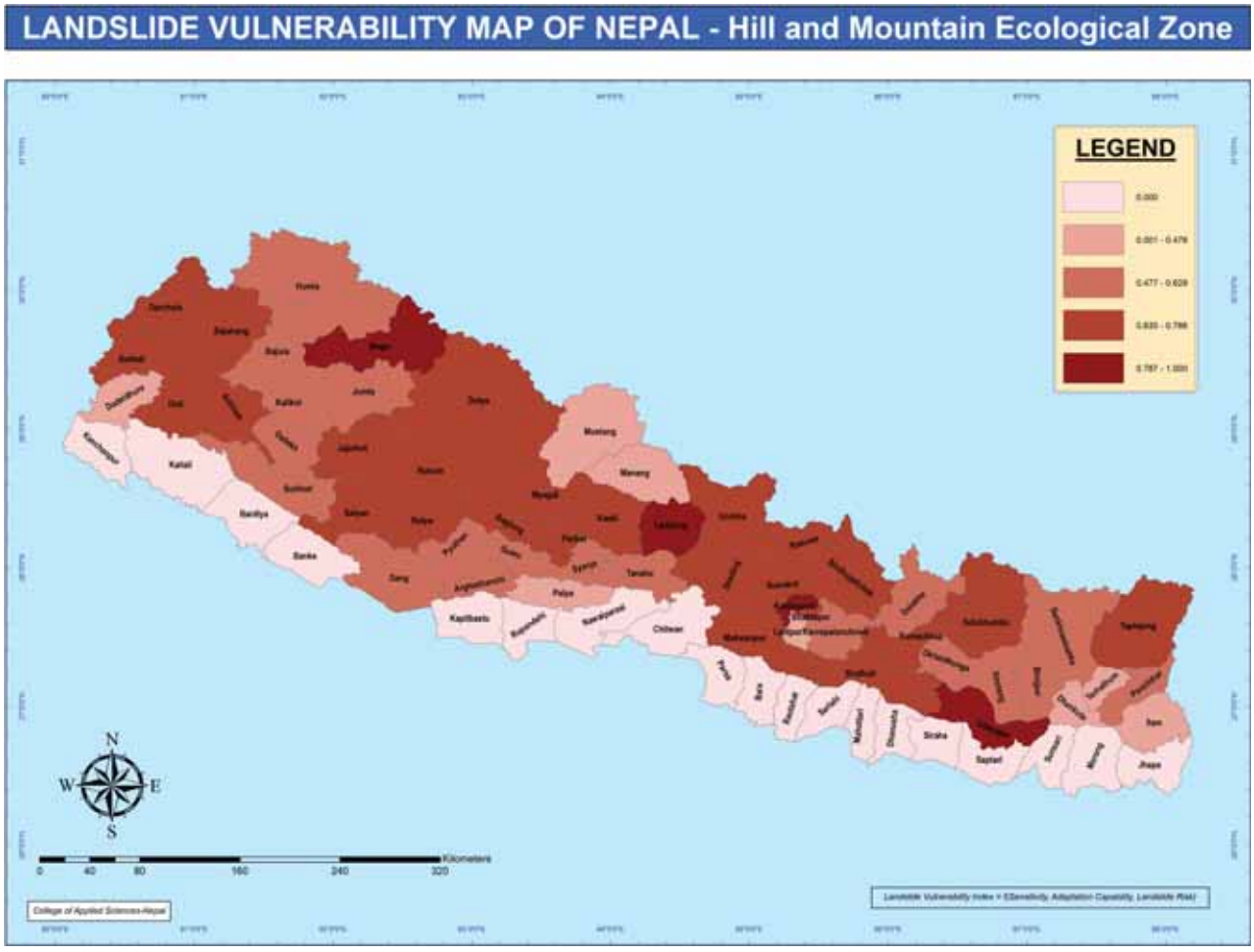
District ranking-Drought Vulnerability Index

Flood Vulnerability	Districts
Very High (0.760-1.000)	Jajarkot, Mugu, Kalikot, Dailekh, Saptari, Achham, Siraha
High (0.515-0.759)	Dolpa, Humla, Kathmandu, Jumla, Dadeldhura, Bajura, Bajahang, Rukum, Salyan, Dolakha, Rolpa, Ramechhap, Doti, Dhanusha, Dhading
Moderate (0.332-0.514)	Baitadi, Sarlahi, Bardiya, Pyuthan, Rasuwa, Manang, Kanchanpur, Mustang, Bhaktapur, Gorkha, Mahottari, Udayapur, Kapilbastu, Darchula, Rautahat, Bhojpur, Solukhumbu, Arghakhanchi
Low (0.181-0.331)	Sindhuli, Parsa, Dang, Banke, Kailali, Gulmi, Taplejung, Sindhupalchok, Lalitpur, Makwanpur, Panchthar, Nuwakot, Chitwan, Baglung, Surkhet, Sankhuwasabha, Kaski, Palpa, Khotang, Nawalparasi, Bara, Myagdi, Parbat, Okhaldhunga
Very Low (0.000-0.180)	Lamjung, Sunsari, Rupandehi, Tanahu, Kavrepalanchowk, Ilam, Terhathum, Morang, Syangja, Dhankuta, Jhapa



District ranking-Flood Vulnerability Index

Flood Vulnerability	Districts
Very High (0.788-1.000)	Mahottari
High (0.534-0.787)	Rautahat, Chitwan, Parsa, Saptari, Siraha, Sunsari, Dhanusha, Bara
Moderate (0.337-0.533)	Sarlahi, Nawalparasi, Kailali, Jhapa, Morang, Kanchanpur, Bardiya
Low (0.001-0.336)	Banke, Kapilbastu, Rupandehi
Very Low (0.000)	Achham, Arghakhanchi, Baglung, Baitadi, Bajahang, Bajura, Bhaktapur, Bhojpur, Dadeldhura, Dailekh, Dang, Darchula, Dhading, Dhankuta, Dolakha, Dolpa, Doti, Gorkha, Gulmi, Humla, Ilam, Jajarkot, Jumla, Kalikot, Kaski, Kathmandu, Kavrepalanchowk, Khotang, Lalitpur, Lamjung, Makwanpur, Manang, Mugu, Mustang, Myagdi, Nuwakot, Okhaldhunga, Palpa, Panchthar, Parbat, Pyuthan, Ramechhap, Rasuwa, Rolpa, Rukum, Salyan, Sankhuwasabha, Sindhuli, Sindhupalchok, Solukhumbu, Surkhet, Syangja, Tanahu, Taplejung, Terhathum, Udayapur



District ranking-Landslide Vulnerability Index

Landslide Vulnerability	Districts
Very High (0.787-1.000)	Udayapur, Kathmandu, Mugu, Lamjung
High (0.630-0.786)	Darchula, Baglung, Rolpa, Achham, Makwanpur, Dolpa, Parbat, Taplejung, Ramechhap, Gorkha, Salyan, Doti, Bajahang, Sindhuli, Bhaktapur, Solukhumbu, Baitadi, Kaski, Rasuwa, Sindhupalchok, Jajarkot, Rukum, Nuwakot, Dhading, Myagdi
Moderate (0.47-0.629)	Bajura, Bhojpur, Okhaldhunga, Sankhuwasabha, Syangja, Dailekh, Arghakhanchi, Tanahu, Kalikot, Kavrepalanchowk, Dolakha, Khotang, Dang, Surkhet, Humla, Gulmi, Jumla, Panchthar, Pyuthan
Low (0.001-0.476)	Ilam, Manang, Dadeldhura, Mustang, Palpa, Terhathum, Lalitpur, Dhankuta
Very Low (0.000)	Saptari, Siraha, Chitwan, Mahottari, Sunsari, Dhanusha, Nawalparasi, Rautahat, Sarlahi, Bara, Kanchanpur, Parsa, Morang, Kailali, Jhapa, Banke, Kapilbastu, Rupandehi, Bardiya

Annex 4. Local perceptions of climate change impacts

Water & Energy	Agriculture & Food Security	Forestry & Biodiversity	Urban Settlements & Infrastructure	Public Health	Climate Induced Disasters
Decreased access to water supplies; Increase in surface run-off leading to erosion & difficulty in capture and storage of water; Increased frequency of floods & drought leading to adverse impact on infrastructure	Changes in crop productivity due to delays in cropping cycle; up-ward shift in agro-ecological zone; increase in crop diseases and pests ; reduced water availability; Decline in livestock productivity due to increase in incidences of disease including sterility & decrease in fodder species; Loss of crop & forest diversity, e.g., Jaluka "wild saag", local rice varieties, wild mint, local cucumber and bitter gourd have disappeared;	Biodiversity loss, including a reduction of wild animals and local & migratory bird species & loss of high altitude herbs & NTFP; Changes to wildlife habitat. Example, upward shifting of tree line; Change in precipitation (snow to rainfall) is exacerbating causes of fuelwood scarcity Increase in disease and insect attacks, including increase of invasive alien species; Early flowering and fruiting Increased dryness in forest Increase in forest fire incidences	Increase in extreme weather events could impact urban infrastructure as well as energy infrastructure like micro-hydro plants; Impact of disasters leading to greater migration to urban areas; Increase disruption to socio-economic infrastructure and human well-being Decrease in supply & quality of water Increase the cost of maintenance of public green spaces, parks and playing fields in settlements	Cold and heat related injuries and illness (heat stress, heat waves) and exposure Deterioration of water & air quality Increased risk of water & vector borne disease Social, Physical and mental stress and workload Damaged public health infrastructure & lack of access to health services during severe weather conditions Health related migration and displacement during epidemic and outbreak of disease	Increase in Flood/Landslides Increase in Drought and dryness Thunderbolt/hail storm/windstorm Increase in Forest fire Outbreak of certain diseases Conflict over natural resources Displacement and migration

Annex 5: Gender sensitivity analysis of climate change impacts

Water & Energy	Agriculture & Food Security	Forestry & Biodiversity	Urban Settlements	Public Health	Climate Induced Disasters
Decreased women's access to water resources increases work load, impacting on reproductive health (e.g. prolapsed uterus) and personal hygiene. Climate induced resource conflicts increases social violence, anxiety and depression in women. Women are often the household members who look after water firewood and energy management. Any risk involving them should be addressed in climate adaptation strategies.	Male out-migration imposes additional work load on women. Women consume less food during shortages causing under-nourishment and weakness - especially during pregnancy and lactation. Women are custodians of local knowledge, agricultural skills and practices (e.g. seed preservation) and other livelihood related activities. Loss of these resources due to climate change would Make women more vulnerable. Adaptation strategies need to improve women's access to these resources. Due to limited access to credit, market, land, and agricultural extension services, women are more vulnerable to adverse climate change impacts.	Reduced availability of income generating forest products affects women and marginal communities directly because of their high level of reliance on such products for revenue generation and as safety nets. Women and marginalized groups have limited access to new information and communications to support adaptation. Climate induced resource use conflict amplifies existing gender inequalities. Women become more vulnerable when conflict leads to social violence, anxiety and depression	Water scarcity would mean that women have to spend more time collecting water. Migration and frequent movements due to temporary displacement related to flash floods pose risks of insecurity and sexual violence against women. Inadequate incorporation of gender concerns in urban planning and policies undermines adaptation. Under representation of women and marginal communities in urban projects and infrastructure development. Women are to be important actors in the development of urban adaptation.	Due to socially constructed multiple roles, more women than men die or get injured from climate change related health hazards Climate change exacerbates gender differentiation and poor health of women. Women bear the brunt of providing increased care of vulnerable children, sick, disabled, and old age people. Climate change-induced diseases, such as respiratory disorders, allergy, asthma and other respiratory diseases appear more among women, marginal people including children. This leads to women's illness, physical and mental stress.	Women have less access to early warning and climate information and generally, lack the skills to survive extreme events. Women face the risk of increased sexual violence in temporary shelters. Cultural and social restrictions curtail mobility of women and their ability to avoid disasters. Women and marginalized people are poorly represented in formulating disaster related policies and programme. In case of food scarcity, women often eat less and also become less careful about their health which also makes them to become more prone to malnutrition and diseases.

Annex 6: Consultations and awareness raising activities

Date	Thematic area	Organizing partner	No. of participants	Focus of discussion	Key observations /feedback
26 June 2009	General, consultation with Youth and media	Direct	45	Introduction to NAPA, CC regime and Nepal, COP 15, role of media in CC	Youth are enthusiastic to contribute to climate change action; youth are interested for volunteer contribution, media is searching for its role
6 July 2009	Local stakeholder consultation in Dolakha	MoE and local partners in Dolakha	37	Climate change introduction, NAPA project and process, observed climatic vulnerability	People's understanding on climate change is clear. Local observations need to be linked with climate science
13 July 2009	Local stakeholder consultation in Nuwakot	MoE and local partners	48	Climate change introduction, NAPA project and process, observed climatic vulnerability	People's understanding on climate change is clear. Local observations need to be linked with climate science
23 July 2009	Agriculture and food security	Ministry of Agriculture and Cooperatives	40	TWGs operations, TWG member selection, facilitation and remuneration	Agriculture sector is more vulnerable to climate change; livestock should not be overlooked, key areas of adaptation need to be identified
2 August 2009	Forest and biodiversity	Nepal Foresters' Association	52	Mitigation vs adaptation, conceptual framework and ownership of TWGs, CC impact analysis and relevancy to forestry and biodiversity	International and local concept of adaptation and mitigation need to be understood, TWG framework and ultimate responsibility and authority boundary should be clarified.
11 August 2009	General, indigenous Women and Climate Change	National Indigenous Womens' Federation	36	Role, right and responsibility of indigenous community, Traditional and indigenous knowledge to cope with climate change	Indigenous communities are more sensitive to climate change, they need support and indigenous knowledge should be identified and recognized

Date	Thematic area	Organizing partner	No. of participants	Focus of discussion	Key observations /feedback
17 August 2009	Climate and disaster	DPNet-Nepal	41	Mainstreaming disaster into climate change regime and link with poverty issues, identification of climate induced disaster	Many work have been done but information is scattered, coordination is vital, research and science back up highlighted
7 September 2009	Indigenous community, rural landscape and climate change	Representing Organizations of Indigenous Communities	55	Evidence of climate change in countryside, local coping mechanisms, indigenous knowledge on climate change adaptation	The experiences shared by the indigenous peoples can be viewed as evidence of climate change, such as locally changed pattern of agriculture and housing, changing biodiversity pattern. local knowledge is useful for coping with climate change
5 November 2009	Regional consultation in Lahan	Lok Kalyan Nepal (Participated districts-Sarlahi, Mahottari, Dhanusha, Sindhuli, Udaypur, Siraha, Saptari)	90	Climate change impacts, upland-lowland relationship, Siwalik situation, livelihoods impacts	Siwalik is in critical situation, Rapid urbanization and population growth has put more pressure on livelihoods, disasters have become more frequent, people's coping capacity is decreasing
10-20 November 2009	Transect appraisal Exercise (details below)	ISET-N, LIBIRD, Practical Solution, NEWAH, FECOFUN, Practical Action, SEBAC	above 1000	Climatic vulnerability observation, people's perception collection and set adaptation mechanism	Increased temperature, decreased water resources, flora and fauna composition changed, introduction of new diseases, decreased agro-productivity, seasonal cycle changed
22 November 2009	Regional consultation in Pokhara	LIBIRD	80	Regional impacts of climate change and adaptation practices	People and local organizations are trying to adapt, state intervention is necessary

Date	Thematic area	Organizing partner	No. of participants	Focus of discussion	Key observations /feedback
12 March 2010	Regional consultation in Dang	Livelihood Forestry Programme (LFP) (Participated districts-Rukum, Rolpa, Pyuthan, Salyan, Dang)	85	Regional impacts of climate change, Adaptation approaches, biodiversity and climate change	LFP piloted community adaptation fund, forests are threatened by climate change so forest based livelihoods are in crisis. Adaptation programme should be implemented through community organizations and their capacity need to be strengthened
15-18 March 2010	National Climate Training for Media	Direct	32	Role of media in climate change and adaptation	National media are not much aware of climate change impacts. Local climate news are not reflected in national media. Greater sensitization is needed
4 April 2010	Local consultation in Syangja	ASK Nepal	110	Climate change impacts in mid hills and adaptation options	Rivulets and springs vanished, decreasing ground cover, temperature increased, agro-productivity decreased, long draught, frequent floods and landslides
20-22 May 2010	Regional Climate Training for Media in Far western Region)	SEBAC-Nepal	40	Regional climate change impacts from media point of view, media coverage and sensitization on climate reporting	Local changes in ecology and climate are obvious but due to lack of knowledge, it is difficult to relate with science. Local journalists could document climate change evidence

Consultations on NAPA draft

Date	Venue	Organizing partner	No. of participants	Nature of Participants	Focus of discussions
17 June 2010	Kathmandu, Hotel Annapurna		50	MCCICC Members, donors, development partners	Vulnerability mapping, adaptation prioritization process, prioritized projects, implementation framework
20-21 June 2010	Nepalgunj (regional)	PSPL	60	GOs, NGOs, civil society, media from mid and far western region	Vulnerability assessment, prioritized project implementation framework, feedback to the proposed projects and implementation plan
25-26 June 2010	Pokhara (regional)	LI-BIRD	40	GOs, NGOs, CBOs (LI-BIRD Partners)	Climate change issues, local adaptation practices, adaptation additionality challenges
11-12 July 2010	Ilam (regional)	NCDC	50	GOs, NGOs, civil society, media from eastern region	Local and regional climate change issues and ways to address those issues through the NAPA
19-22 July 2010	Nagarkot (national)		35	Govt. officials, media, UNFCCC negotiators	NAPA concept and development, key features of Nepal's NAPA and expected outcomes, implementation Plan
29 July 2010	Kathmandu	Practical Action	15	I/NGOs, civil society	NAPA process, vulnerability assessment, prioritized projects, role of NGOs/civil society in NAPA implementation
11 August 2010	NPC		10	National Planning Commission's Vice Chair and officials	NAPA process and outcomes, coordination and implementation plan
13 August 2010	MoE		18	NAPA Advisory Board	NAPA and expanded NAPA, coordination and implementation framework, NAPA follow up, LEG comments
29 August 2010	Office of the Prime Minister	Climate Change Council	35	Climate Change Council members, and MoE and Prime Minister's Office's officials	NAPA prioritized projects, implementation mechanism, funding sources etc.
23 September 2010	MoE		40	Climate Change Council Expert members and MCCICC members	Final NAPA outcomes

Transect Appraisal Exercise

Transect	Coverage districts	Partner Organization	Direct Participation	Key outputs
Eastern (Koshi Basin Region)	Sankhuwasabha, Terathum, Dhankuta, Morang, Sunsari	Practical Solution, NEWAH, FECOFUN, East Foundation	above 1000	Peoples' perception on climate change, mass sensitization, vulnerability observation, triangulation with stocktaking, active involvement of TWGs, vital information for NAPA
Western (Gandaki Basin Region)	Mustang, Myagdi, Parwat, Baglung, Kaski, Syangja, Palpa, Rupandehi, Kapilwastu	LIBIRD	above 1200	Peoples' perception on climate change, mass sensitization, vulnerability observation, triangulation with stock taking, active involvement of TWGs, vital information for NAPA
Far Western (Karnali Basin Region)	Darchula, Dadeldhura, Doti, Achham, Kailali, Kanchanpur, Baitadi, Banke, Bardiya)	Practical Action, SEBAC Nepal	Above 1000	Peoples' perception on climate change, mass sensitization, vulnerability observation, triangulation with stocktaking, active involvement of TWGs, vital information for NAPA

Annex 7. List of priority adaptation options for agriculture and food security

Climate change effect/ Impacts	Adaptation options
Increases in intense rainfall/ Epidemics	Awareness raising
	Provision of the food/clean drinking water
	Promotion of Community level waste management
	Provision of emergency health care
Reduced rainfall & increased of temperature/ Drought	Identification of Potential drought prone area
	Forecasting
	Livelihood diversification
	Distribution of drought resistant crops species
	Provision of food aid
Reduced rainfall & increased of temperature/ Forest fire	Awareness raising
	Conservation/promotion of afforestation reforestation programme
	Forest fire control
Increased temperatures/ GLOF and avalanche	GLOF/Avalanche mitigation
	Awareness Raising
	Early warning system and forecasting
Increased temperatures/ Heatwave	Awareness raising
	Reforestation/Afforestation
Other/ Coldwave	Awareness raising
	Provision of the warm clothes
Other/ Hailstorm/Windstorm and Thunderbolt	Provision of Insurance
	Community based fund
	Livelihood diversification
	Weather forecasting

Annex 8. Adaptation options for agriculture and food security identified during the transect appraisal exercises

	Agriculture and food security climate adaptation options
Terai	Replace shallow with deep tube wells Introduce toria, niger, arahar, maize in place of potatoes and jute Better rain water collection Introduce short maturing and hardy crops Use of anti-helminthics Use of local pesticides and insecticides Use of high potential drugs to control aphids Reduction of synthetic fertilizers and increased use of organic manures Minimum or zero tillage Address market and production issues through farmers' cooperatives New varieties of crops adopted due to higher temperatures Fruits and vegetables in reduced water availability and unpredictable rainfall areas Micro-irrigation Use of alternative energy options Plantations to restore natural water supplies Water harvesting Flood control Breeding more adaptable varieties and breeds Insurance Schemes for crops and livestock Small-scale irrigation Local capacity building Public awareness Early warning system Trainings on new technologies River-training programmes
Mid hill	Grow vegetable crops, toria, niger in place of potatoes Selection of short duration crop varieties Rain water collection Drip irrigation Increased use of anti-helmintics, pesticides, insecticides, Use of high potential drugs to control aphids Use improved varieties and fertilizers, Pump water from downstream Rain water harvesting at local level Water conservation ponds Use of ground water Increase community awareness on climate change adaptation Studies on climate change in relation to disease, pests, parasite incidence, Epidemiological study of prevalence of plant, animal diseases, and parasites in different climatic zones Increase community awareness on crop and livestock insurance, market outlets, seed bank, decentralized buffer stock, cold storage etc Plantations to maintain micro-climate Promote agro-forestry, Promote water harvesting Improve water sources, Breeding adaptable variety and breeds, Community awareness, crop, livestock insurance, market outlets, Promote seed bank, Establish decentralized buffer stock, cold storage

	Agriculture and food security climate adaptation options
Mountain	Tree planting around farm lands and water sources Replace present crops with hardier varieties Rain water collection Restricted grazing Change in tree crop type e.g. from apple to orange Tapping snow water sources Small scale irrigation Alternative energy sources e.g. improved cooking stove; solar panel; back boiler; smoke water heater; micro hydro power Forest plantation Government introduced micro-irrigation technology Soil conservation works Provision of training Establishment agro-industries

Annex 9. List of priority adaptation options for the water sector

Themes within the water sector	Climate adaptation relevant programmes
Water Induced Disasters	Water-related Disaster Management Policy and Program
	Risk/Vulnerability Mapping and Zoning Program
	Disaster Networking and Information System Improvement Program
	Community-level disaster preparedness program
	Relief and Rehabilitation Measures
	Activation of Inundation Committee
	Flood, Drought, Landslides/Debris Flow, GLOF and Avalanche Adaptation Program
Environmental Action Plan on Management of Watersheds and Aquatic Ecosystems	Improve Environmental Database System
	Map Climatically Sensitive Watersheds and Aquatic Ecosystems
	Develop Water and Wastewater Quality Standards and Regulations
	Implement Climate Change Adaptation/ Water Conservation/ Education/Awareness Program
	Implement climatically sensitive Watersheds and Aquatic Ecosystems Protection, Rehabilitation and Management Programs
	Promote Community Participation in the Management of Watersheds and Aquatic Ecosystems to enhance climate change adaptation
	Enhance Institutional Capacity and Coordination
	Develop Watershed Management Policy
Water Supply, Sanitation and Hygiene	Accelerated Stand-Alone Sanitation Improvement Program (ASASIP)
	Rural Water Supply and Sanitation Program (RWSSP)
	Small Towns Water Supply and Sanitation Program (STWSSP
	Kathmandu Valley Water Supply and Sanitation Program (KVWSSP)
	Major Towns Water Supply and Sanitation Program (MTWSSP)
	Water Supply and Sanitation Institutional Strengthening Program (WSSISP)
Irrigation for Agriculture	Integrated Program for Irrigated Agriculture
	Improved Management of Existing Irrigation Schemes
	Improved Planning and Implementation of New Irrigation Systems
	Strengthening of Capacity Building of Local Level Institutions in Planning and Project Implementation

Themes within the water sector	Climate adaptation relevant programmes
Hydropower Development	Program to develop cost-effective micro, small, and medium hydropower
	Program to enhance rural electrification
	Program to Improve Power System Planning
	Program for Power and Energy Sector Reform and Development
Water-related Information Systems (Decision Support	Management of existing hydrological and meteorological network at DHM
System for River Basin Planning	Extension of hydrological and meteorological networks of DHM
and Management)	Funding and management of hydrological and meteorological networks of DHM
Regional Cooperation Frameworks	Program to appraise and understand the water-related needs of neighboring countries
	Program to pursue confidence-building measures with neighbors
	Programs to implement mutually beneficial development activities
Policy and Legal Frameworks	Policy and Legislation related to water resources management reviewed, amended and harmonized in the context of climate change
Institutional Mechanisms	Restructure and activate central planning organization
	Institutional Capacity Building of Government Agencies at Central and Local Level
	Central Level Institutional Setup for Study, Research & Development on Climate Change Prediction, Policy Mainstreaming, and Adaptation
	Set up institutional framework for coordinated and integrated development at the basin level

Annex 10. List of priority adaptation options for the energy sector

Themes within the water sector	Climate adaptation relevant programmes
Formulate National Energy Strategy (NES) and National Energy Plan (NEP)	Formulate National Energy Strategy and National Energy Plan taking into consideration of climate change based on the doctrines of integration, coordination, decentralization, popular participation and implementation of energy programs within the framework of good governance, equitable distribution and sustainable development
	Afforestation Programs to maintain the balance between Annual Fuel Wood demand and Supply for Rural Household Energy
Promote Alternative Energy Technologies	Scaling up of biomass energy technologies (quantity, quality, and coverage) for less fuel wood consumption
	Develop and promote solar energy technologies
	Develop wind energy
	Up scaling the Development of improved water mills
	Research and Development Bio-fuels
Utilization of Gravity Energy	Promotion for utilization of gravitational energy
Energy Switch Over	Promote electrical Vehicles
	Promote energy efficiency
	Promote use of electrical appliance at the households
	Promotion of Solar energy in public lighting
	Promote blended fuels
	Promote the use of natural gas source available within the country
Monitoring and Evaluation of	Monitoring the performance of alternative energy technologies
Alternative Energy Technologies	Monitoring and evaluation of the social, socio-economic and health indicators of the users of alternative energy
	Policy and Legislation related to energy management reviewed, amended and harmonized
Institutional Mechanisms	Restructure and activate central planning organization
	Restructure and strengthen government ministries and departments
	Maintain clear separation of roles between policy, operation and regulation/monitoring
	Strengthening institutions involved in alternative energy equipment manufacturing and supply
	Supporting the NGOs, CBOs and Private sectors for promotion of bi-fuels use in the communities
	Support to Academic and Research institutions
	Set up institutional framework for coordinated and integrated development at the VDC, District and central level

Annex 11. List of priority adaptation options to address climate-induced disasters

Climate change effect/ Impacts	Adaptation options
Increases in intense rainfall/ Floods	Enhance the capacity of all the water-induced disaster related institutions
	Strengthen early warning system and forecasting
	Promotion of reforestation/afforestation programme
	Implementation of structural measures
	Conservation of Churia/Siwalik regions
	Strengthen the capacity and coordination of GO, CBOs, NGOs, INGOs, local authorities, professional societies for disaster management networking
	Hazard/vulnerability mapping and zoning
	Discouraging and restricting settlements in high risks-areas
	Establishment and management of emergency supply ware house
	Making preparations for emergency response, relief and rehabilitation measures
	Activation of inundation committee
	Clearing water logging
	Resettlement of vulnerable community
	Provision of transport and access to market
	Designs of the islands for the villagers to be used during the flood
	Implementation of the building codes
Increases in intense rainfall/ Landslides	Hazard mapping and Risk zoning
	Awareness raising
	Discouraging and restricting people living in high risk areas
	Resettlement of the vulnerable community
	Promotion of afforestation /reforestation programme and bioengineering technique
	Implementation of structural measures
	Inventory on landslides
	Implementation and promotion of water harvesting system and conservation ponds
	Improvement of the degraded land
	Promotion of proper agriculture practice

Annex 12. List of priority adaptation options for forests and biodiversity

Areas for climate change effect/ impacts	Adaptation responses
Community based forest fire control	Capacity building programme for forest managers, awareness building programme for communities, fire prevention programme for forest managers, as well as policy reform for effective and easy implementation.
Programmes of forest pathogen control	Identification of pathogens, study of life cycle of pathogens, developing appropriate mechanism, training to the forest managers.
Control of invasive species	Research to control invasive species (Michenia), control mechanism dissemination.
Integrated forest management for water	Management of vegetation which results increase in infiltration and decrease in evapo-transpiration
	Management of vegetations which result less evapo-transpiration.
	Increase ground water recharge through conservation pond (reservoirs) and contour ditches
	Protection of water source from landslides, erosion and other disturbances.
	Protection of forest water canals from excessive loss
Integrated Watershed Management in context of climate change	Vegetation management, conservation farming, improving recharge through conservation ponds and other mechanisms.
Watershed conservation in Mustang	Identification and implementation of wind erosion control activities such as shelterbelts, buffer strips, control of water erosion activities, promotion of water conservation measures through vegetation and land management.
Wildlife management in relation to climate stress	Identification of wildlife impacted by high temperature and drought, habitat improvement, development and implementation of conservation plans.
Vulnerable species conservation	Identification of species, preparing and implementing management plan
High altitude rangeland conservation	Identification of the management area, preparing rangeland management plan, training to local communities.
Management in Landscape level	Identification of threatened flora and fauna, establishment of corridors and connectivity, identification of activities for their movement and dispersal, preparing and implementation of landscape level conservation plan.
Management of Wetlands	Preparation and implementation of wetland conservation plans with involvement of local communities.
Management of Herbs for Poverty Reduction	Identification of risk region, species at risk, preparing and implementing management plan with involvement of local and indigenous communities.
Conservation of riverine forest	Identification of appropriate forest types, preparing and implementing management plans with participation of local communities.

Areas for climate change effect/ impacts	Adaptation responses
Trees outside the forests or Agro-forestry in communal and private land	Identification of empty land owned by household and communities, promoting appropriate species according to need of local communities, awareness building for promotion of trees in private and community owned land.
Private Land Conservation Forestry	Identification of proper area for promoting private forestry, training land owners in tree plantation and management, providing subsidy for private forest promotion.
Collection and Maintenance of Biodiversity Database	Selection of pilot area, preparation of biodiversity database in the region.
Payment of Environmental Services	Establishment of forum for upstream and downstream communities interaction, conservation of resources in upstream, implementation of upstream conservation measures. Initiation of discussion among up-steam and downstream communities for payment of environmental services.
Awareness and Capacity Building of Stakeholders	Awareness building to local communities and other local stakeholder in the potential climate hazards in the area, training local communities to combat potential hazards.
Policy Reform	Incorporation of climate friendly policies in forest sector policy for climate adaptation and mitigation, joining sector adaptation activities also for mitigation.
Research and Development for adaptation	Identification of research issues, conducting research with involvement of vulnerable local communities.

Annex 13. List of priority adaptation options for public health

Need for climate adaptation	Adaptation responses
Reduce the impacts of climate change on human health	Strengthening health system.
	Awareness raising and capacity building,
	Promotion of appropriate local adaptive knowledge,
	Coordination among concerned stakeholders,
	Integration of health impacts of climate change into broader development plans and related activities.
	Research on climate change and health for evidence based planning.

Annex 14: List of priority adaptation actions for urban settlements and infrastructure

The following adaptation options were identified by the TWG for urban settlements and infrastructures. The risk factors taken into account in selecting the adaptation options include: those that pose a significant threat; risks that are already perceived; risks that will increase most rapidly; and, risks to urban areas and infrastructure that are highly sensitive to climate changes.

1. Downscaling climate change scenarios at meso-level
2. The use of downscale climate change findings to train/raise capacity building and educating policy makers, planners, officials of GON, engineers from the respective metropolitan/municipalities
3. Enforcement of planning regulations, building codes in urban areas incorporating climate change dimensions.
4. Replicate eco cities, healthy cities projects of DUDBC in other municipalities
5. Demarcation of territories, water ways and buffer zones by constructing paths etc.
6. Piloting rain water harvesting structures such as ponds for ground water recharge, dampening peak flows (in and upstream of) urban areas. Encourage the practice of "Harvest Where It Drops". For this promote programs of rainwater harvesting at community level.
7. Development of nationwide urban groundwater monitoring system and enhancement of regulatory measures
8. Water management of River basin management at municipal level.
9. Establish, rehabilitate, and conserve small scale drinking water supply schemes and traditional water sources
10. Rehabilitation of traditional ponds
11. Exploration and assessing the possibilities of increasing water discharge in the polluted rivers like Bagmati
12. On site sanitation at community where city level system doesn't exist.
13. Establishment of household and community level waste management, replicate community managed wastewater treatment system where city level system doesn't exist or works.
14. Establishment of sanitary landfill sites for waste disposal
15. Establishment of municipal compost plant and explore and develop strategy to link with CDM to generate additional revenue
16. Establishment of biogas systems in hotels, colleges, army barracks, police posts and households
17. Conservation of water and reuse of waste water
18. Establishment of early warning systems for flood
19. Use of energy efficient system and appliances, energy efficiency through loss reduction in transmission and distribution.
20. Development of mass transport

The Government of Nepal holding a historic cabinet meeting in Kalapatthar (5,542 meters), near the base of Mt. Everest on the eve of the Fifteenth Session of the Conference of Parties (COP15) to the United Nations Convention on Climate Change in December 2009. The cabinet meeting aimed to call the attention of the international community to the long-term impacts of climate change on the Himalayas and to urge countries to take urgent adaptation and mitigation measures. *(Photo credit: Government of Nepal, Department of Communication, 2009)*

Government of Nepal
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