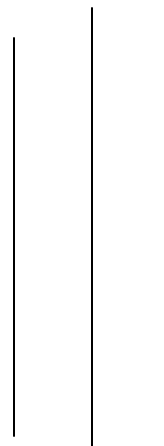
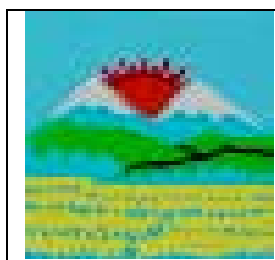


Research Report
on
Climate Change: Impacts and Urgent Adaptation Actions in Dang
District of Nepal



Submitted to



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Date: November 28, 2011

Date: 28th November 2011

The
President
Renaissance Society Nepal (RSN)
Balkot-2, Bhaktapur
Nepal

Subject: Submission of Research Report on "Climate Change: Impacts and Urgent Adaptation Actions in Dang District of Nepal".

Dear Sir,

This research report is prepared to develop and submit innovative project proposal in Multi Stakeholder Forestry Program (MSFP, Innovative Fund), Service Support Unit (SSU), Kathmandu. Complete research report is prepared based on field level research carried out from November 11-18, 2011. Research is limited only in 4 VDCs of Dang district which are in priority list of NAPA program of Nepal.

Report mainly focussed on complete review of national climate change documents and existing climate change issues found in targeted VDCs. In addition to this, immediate climate change adaptation measures are also recommended.

I hope, this document will be a primary source to design innovative project for **MSFP Innovative Fund**. I would like to request to accept and approve this document as a reference report of organization.

Sincerely Yours'

Submitted by
Krishna Bdr. Thapa Chhetri
Researcher/PD Officer, RSN

Approved by
Madan Bahadur Thapa
President, RSN

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List of Abbreviations

ADB	Asian Development Bank
GDP	Gross Domestic Product
IPCC	Intergovernmental Panel on Climate Change
GoN	Government of Nepal
VDCs	Village Development Committees
DDCs	District Development Committees
NAPA	National Adaptation Program of Action
LAPA	Local Adaptation Program of Action
FGDs	Focus Group Discussion
CBOs	Community Based Organizations
UGs	User Groups
DFO	District Forest Office
DAO	District Agriculture Office
GHGs	Green House Gases
UNFCCC	United Nations Framework Convention on Climate Change
UN	United Nation
GLOFs	Glacial Lake Outburst Flood
NGOs	Non-Governmental Organizations
CFUGs	Community Forest User Groups
CBS	Central Bureau of Statistics

Climate Change: Impacts and Urgent Adaptation Actions in Dang District of Nepal

1. Background

1.1 Geography

Nepal is situated in the lap of the Himalayas. It is located between the latitude 26°22' to 30°27' North and longitude 80°4' E to 88°12' East, and elevation ranges from 90 to 8,848 meters. The average length being 885 km east to west and the average breadth is 193 km from north to south. The country is bordering between the two most populous countries in the world, India in the East, South, and West, and China in the North. Nepal is a land of extreme contrasts in climate and geography. It has a unique topography ranging from lowlands with sub-tropical jungles to arctic conditions in the Himalayan highlands. Within a mere 150 kilometers the land rises from near sea level in the south to over 8000 meters in the North. This, together with the monsoon rainfall along the south facing slopes, has resulted in compacting virtually all climate zones found on planet Earth. As a result, Nepal has been endowed with a great diversity of life-zones providing a home for a large variety of plants, birds and animals. Government of Nepal has set aside more than 13,000 sq. kms of protected areas including 10 National parks, 4 wildlife reserves, 3 conservational areas and that include as many bio-geographic regions as possible to assure conservation of the maximum numbers of wildlife species.

Nepal has more than 6000 rivers that largely drain from north to south. The three main rivers are Karnali, Gandaki and Saptakoshi. Forest occupies 39.6% of the total land area. The significant amount of energy is used from the biomass based energy which fulfills 80% demands of total population. Less than a third of population has access to electricity which comes from hydropower.

Table: Climate Characteristics of different ecological belts of Nepal

Physiographic Zone	Ecological Belts	Climate	Annual Precipitation	Mean Annual Temperature
High Mountain	Mountain	Arctic/alpine	Snow/150mm-200mm	3-10 degree centigrade
Middle Mountain	Hill	Cool/Warm	275mm-2300mm	10-20 Centigrade
Siwalik/Terai	Terai	Tropical/Sub-Tropical	1100mm-3000mm	20-25 Centigrade

Source: WECS, 2009

1.2 Population

Nepal population is close to 28 million as of august 2010. Nepal ranks 193 out of total 210 in terms of Gross National Income adjusted for purchasing power (ADB 2009). The population is predominantly rural with some urban centers such as Kathmandu valley that is going importance. Above 85% of total population is dependent in subsistence type of farming which contribute 33% to the Gross Domestic Products (GDP) and industrial contribution is 23%. Tourism contributes significantly in income which receipts in 2000 aiming to 15% exports (Regmi and Adhikari 2007).

Nepal in essence is a cultural mosaic comprising different castes and ethnic groups belonging to the Tibeto-Burman and Indo-Aryan linguistic families, which is indicative of the waves of migration that have occurred for over 2000 years from the north and south respectively. Although intermingling between the various groups have occurred, they differ widely in the details of culture and adoptions, combining elements Buddhism, Hinduism and Islam picked up through the cultural contacts over the years.

1.3 Climate

Nepal's climate is influenced by the Himalayan monsoon range and south Asian monsoon. The climate, mainly influenced by the monsoon and westerly disturbance, is characterized by four distinct seasons: pre-monsoon (March-May), Monsoon (June-September), post-monsoon (October-November) and winter (December-February). Average annual rainfall is 1800 mm but there are marked spatial and temporal variations both north-south and east-west. The monsoon rain is most abundant in the east and declined in the westwards, while the winter rains is higher in the north-west and decline south eastwards. The highest rainfall is experience in Pokhara, Kaski district, of Nepal. Temperature varies with latitude and season. It increases from north to south and decreases with altitude. The winter season is coldest, with the highest temperature during the pre-monsoon period.

2. Rational of Study

The intergovernmental Panel on Climate Change (IPCC) has confirmed global climate change. The report of the government of Nepal based on analysis of the temperature recorded between 1981 and 1998 shows an increase of 0.41°C per decade. Although the analysis is based on data for a relatively short period, it shows that Nepal is warming at a significantly higher rate compared to the global average of 0.74°C recorded in the twentieth century (IPCC 2007). Climate change impacts are in every aspect of nature and human life, and it is predicted to continue. Climate change impact areas are glaciers and water resources, agriculture, biodiversity and natural resources, water induced disasters and socioeconomic aspects of human life.

Glacier is a much highlighted subject when discussing the impact of climate change in Nepal. Compared to other aspects, several studied have been carried out in Glaciers in Nepal. Studies shows that Nepal's glaciers are retreating faster than the world average and the number and size of glacier lakes are increasing along with increase in temperature. However, there is not detail study about impact of climate change on ecological change, local agriculture and livelihood. Ecological changes noticed in that region indicate that global warming will have a serious impact on the lives and livelihoods of local communities. Local communities have already begun experiencing unusual changes in weather patterns, anomalies in the growth pattern of plants, such as sprouting and onset of flowers. Some of them are happy with these changes; for example, farmers have noticed improved apple sizes in recent years. But others face hardship; for example, water leakage into traditional houses has increased, which people feel is due to new precipitation patterns.

These findings need to be validated by scientific studies, but the urgency to support affected communities is already clear. They need help to enable them to respond to the new challenges posed by climate change. Rainfall data indicates a decrease in winter precipitation and an increase in rainfall after the winter months. Snowfall in the post-winter season affects crop farming, but people have a strong belief that current changes in the rainy season are temporary and will eventually revert back to how they used to be. The local observations described above provide a clear direction for future research and for development

planning and disaster management programmes in the high Himalayas. More scientific studies are needed to validate these observations. Moreover, some research on climate change impacts and the associated risks in mountainous regions, especially human settlement, land cover, and biodiversity is needed.

3. Objectives of Study

The overall objective of the study is to assess the existing climate change impacts and identify the adaptation measures to develop climate resilience in different VDCs of Dang district of Nepal. The specific components of research are as follows:

- To conduct overview of National Adaptation Program of Action (NAPA) to climate change and Climate Change Policy of Nepal.
- Identify the existing climate change issues found in different VDCs of Dang district.
- Find out and recommend adaptation measures and actions to mitigate impacts.

4. Research Methodology

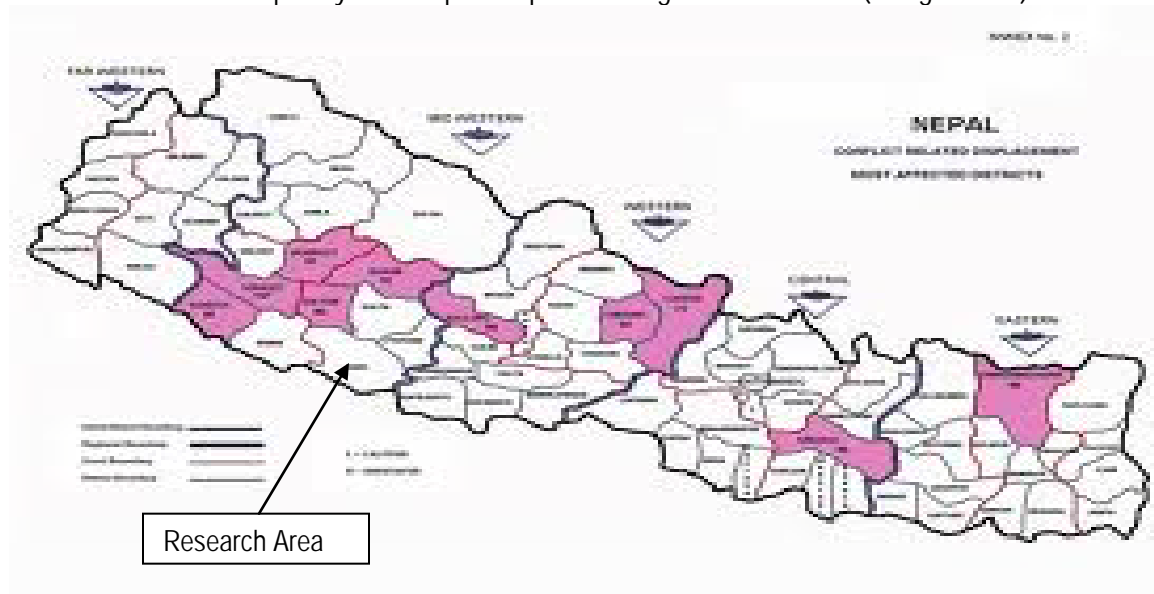
This study is both literature review and analysis and field based observations and recommendations. Following methods of study were carried out during research period.

- a) **Desk Study for Secondary Data:** Secondary information was collected through vigorous study and review of NAPA, Local Adaptation Program of Action (LAPA), Climate Change Policy and other relevant published policies, papers and documents.
- b) **Field Study for Primary Data:** Field based information regarding to climate change issues and impacts were collected from field visit conducted from Nov. 11-18, 2011. During field visit, research team was observed different communities and geographic locations of target VDCs. Climate change impacts in change in topography, vegetation and climate induced hazards were visually inspected. Target VDCs were Rajpur, Hansipur, Goltakuri, Bela and Bagmare. Different priority components of NAPA such as Agriculture and food security, forestry, Infrastructures, Water resources, energy, Capacity enhancement and Gender Capacity. Following research methods were applied during research period which are as follows.
 - Focus Group Discussion (FGDs) with community people
 - Interview and Stakeholders consultation
 - Meeting with local representatives of Community Based Organizations (CBOs), Civil Society and political leaders.
 - Consultation with governmental organizations such as District Development Committee (DDC), Village Development Committee (VDC), District Forest Office (DFO), District Agriculture Office (DAO) and district based other line agencies.
 - Consultation with relevant national and local experts.

5. Study Area, Limitation and Target Groups

Local Adaptation Program for Action (LAPA) has divided districts and VDCs in different Hubs for study and to implement various adaptation actions. Among different hubs, Dang-Hub includes four districts such as Dang, Bardiya, Rolpa and Rukum. This study is focused in 5 VDCs of Dang districts like Rajpur, Hansipur, Goltakuri, Bela and Bagmare. VDCs are selected by LAPA program and selection is balanced by geographic variations such as Terai (Plain area) and mountains.

Map: Physical Map of Nepal Showing Research Area (Dang District)



The target beneficiaries are women, youths, farmers, local women's groups, clubs, cooperatives, agriculture entrepreneurs, agriculture technicians and other individuals which are directly affected by climate change impacts and hazards. Study is mainly focused in marginalized community areas and households.

6. Research Findings

6.1 National Adaptation Program for Action (NAPA)

6.1.1 NAPA Framework and Goals

Nepal is undergoing the transition from monarchy dominated governance system to a federal democratic republic system. Preparation is under the way to write new constitution. At this historic and political situation, strong efforts have been made to develop NAPA through genuine and conclusive actions. Nepal's NAPA is set within the countries' developmental objectives. These objectives have been articulated in the national planning strategies and are aimed to addressing specific economic and socio-political conditions prevailing in the country. Nepal's developmental goals, and therefore the NAPA framework, are set under the overriding goals to reduce national poverty.

Table: NAPA Framework and National Development Goals

NAPA Thematic Areas	Summary of 10 th Plan and Interim Development Goals
Agriculture and Food Security	<ul style="list-style-type: none"> ▪ Agriculture goal is a major priority in 10th plan and continue in the three year Interim Plan (2010-2013). ▪ The 10th plan envisaged agriculture growth to increase by 4.1% and Livestock by 4.9% per annum. ▪ The Agriculture Perspective Plan (1995) emphasized the stronger role of private sector involvement and increased role of communities, farmer's groups and cooperatives in the development of infrastructure and assets.

Water Resource and Energy	<ul style="list-style-type: none"> ▪ The 10th Plan prioritized the power sector and aimed to expand electricity coverage in a sustainable and environmental friendly manner ▪ Increased irrigation supply through new irrigation facilities and rehabilitation and strengthening of public and community based irrigation system along with the use of and scaling up non-conventional schemes using micro irrigation technologies
Forest and biodiversity	<ul style="list-style-type: none"> ▪ Forest management was prioritized in the 10th plan to its role in promoting rural livelihoods and providing environmental services ▪ The three year Interim Plan envisioned that in addition to providing the necessary goods and services to rural community.
Public Health	<ul style="list-style-type: none"> ▪ To reduce the magnitude of poverty sustainability and make it sustainable by developing and mobilizing health human resources. ▪ The three IP envisions establishing appropriate conditions of quality health service delivery accessible to all people.
Urban settlement and Infrastructure	<ul style="list-style-type: none"> ▪ Focused to infrastructure development, especially on road net works and expansion of electricity and national communication infrastructure
Climate Induced Disasters	<ul style="list-style-type: none"> ▪ The long term vision of National Strategy for Disaster Risk Management (2009) is to establish disaster resilience communities.

6.1.2 Objectives of NAPA

Nepal's NAPA aims to enable Nepal to respond strategically to the challenges and opportunities posed by climate change. The main objectives are to:

- Assess and prioritize climate vulnerabilities and identify adaptation measures
- Develop and maintain a knowledge management and learning platform.
- Develop a multi-stakeholders framework of action on climate change

6.1.3 Climate Change Vulnerability of Nepal

NAPA has set climate change vulnerability reports of Nepal by overlaying climate risk/exposure map, sensitivity maps and adaptation capacity maps following the Vulnerability assessment Frame work of IPCC.

Table: Districts ranked as climate change Vulnerability index

Vulnerability Ranking	Districts
Very High (0.78-1.00)	Kathmandu, Rammechap, Udayapur, Lamjung, Mugu, Bhaktapur, Dolakha, Saptari and Jajarkot
High (0.60-0.780)	Mahottari, Dhading, Taplejung, Siraha, Gorkha, Solukhumbu, Chitwan, Okhaldunga, Achham, Manang, Dolkha and Kalikot
Moderate (0.35-0.60)	Baglung, Sindhuli, Mustang, Rolpa, Rukum, Parbat, Sunsari
Low (0.18-0.35)	Nuwakot, Dhankuta, Bardiya, Kanchanpur, Gulmi, Pyutha, Surkhet, Dang, Lalitpur
Very Low (0.00-0.10)	Illam, Jhapa, Banke, Palpa, Rupendhai

Source: MoE, 2010, *Climate change vulnerability mapping of Nepal*

Nepal's low level of development and complex topography renders it vulnerable to Climate Change. The ongoing climate change projected to occur is likely to have impacts on different sectors of Nepal. The sensitive sectors are as follows: agriculture, and food security

- Water Resource and energy
- Climate induced disasters
- Forest and Biodiversity
- Public Health
- Urban Settlement and Infrastructure
- Cross cutting sector

6.2 Climate Change Policy and Dimensions

6.2.1 Background of the Policy

Climate change is a natural phenomenon. Anthropogenic climate change has been accelerated by the emission of greenhouse gases (GHGs), primarily from industrialization, deforestation and increased use of fossil fuels for transport. Scientific evidence, as cited by the Inter-governmental Panel on Climate Change (IPCC), clearly indicates the wide scale of climate change. Accordingly, the United Nations General Assembly adopted a resolution to develop an international legal instrument to address this global problem. In accordance with this, the Inter-governmental Negotiation Committee met several times and the United Nations Framework Convention on Climate Change (UNFCCC) was adopted in May 1992. This Convention was opened for signature at the UN Conference on Environment and Development in Rio de Janeiro, Brazil in June 1992. Nepal signed this Convention on 12 June 1992 and became Party to it in 1994.

The IPCC Fourth Assessment report clearly indicates that anthropogenic activities have accelerated the process of global climate change. Increasing GHG emissions has contributed to the increase in the atmospheric temperature, resulting in location-specific impacts. There have been changes in rainfall patterns (high, low, and intensive rainfall) and seasons due to climate change. These have direct and indirect impacts on water resources, agriculture, forests and biodiversity, health, infrastructure development, tourism, and livelihoods. Recognizing this, the international community is actively engaged in minimizing the current effects and likely future adverse impacts through effective implementation of the UNFCCC provisions.

6.2.2 Problems and Challenges

There are very few studies about the effects and likely impacts of climate change in Nepal. Scientific evaluations are yet to be carried out to understand the types and degrees of impacts on specific geographical region and development sector. Activities related to climate modelling and assessing the ongoing effects and likely impact of climate change in natural resources, including water resources and other economic sectors from the mountain and hill regions to the plains in the south, have not been carried out due to inadequate human and financial resources and lack of appropriate equipment. Detailed studies, surveys and monitoring of snow and glacier melting and glacier lake outburst floods (GLOFs) have yet to be conducted. The detailed impacts from climate change on agriculture, water resources, forests and biodiversity, public health, disaster incidence, tourism and other related sectors has yet to be assessed. Similarly, programmes for avoiding, minimizing or adapting to the changing climate by developing appropriate technologies for risk reduction and disaster preparedness have also yet to be implemented. The major challenge is the lack of an effective framework for addressing the adverse

impacts of climate change; such a framework should consider the UNFCCC provisions and decisions of the Conference of the Parties, including adaptation, mitigation, finance, technology development and transfer, capacity building, and climate resilience. Although climate change has become an issue of global importance, there is a lack of institution which can examine climate change from the perspectives of science and technology. Following challenges are present in Nepal

- a) National efforts to make the socio-economic sectors climate-resilient is a great challenge due to the lack of knowledge, scientific data and information related to the science of climate change and its impact on different geographical and socio-economic development sectors and use of climate modelling to assess likely impacts.
- b) It is also a challenge to assess the effects and likely impacts of climate change, to identify the vulnerable sectors and enhance their adaptive capacity, and to develop a mechanism for reducing GHG emissions.
- c) It is necessary to create an enabling environment for technical and financial opportunities at the national and international level in the process of addressing climate change impacts.
- d) It is equally necessary to make the country's socio-economic development climate-friendly, and to integrate climate change aspects into policies, laws, plans and development programmes, and implement them.
- e) Current and likely adverse impacts of climate change have to be established between upstream and downstream areas so as to promote regional cooperation.
- f) In order to achieve the U.N. Millennium Development Goals and avoid or minimize the impacts of climate change on mountain environments, people and their livelihood, and ecosystems, the country should be able to take full advantage of the international climate change regime.

6.2.3 The Need for a New Policy

In order to face the challenges and solve the problems mentioned above, succeed in current efforts and maximize the benefits from the Climate Change Convention, formulation of a new policy with the following aspects is urgently required:

- a) To inform Parties to the UNFCCC about the implementation of the Convention along with institutional development, capacity enhancing, technology development and utilization, fund flow and GHG measurement, and updating data and information;
- b) To promote climate adaptation, mitigation and carbon sequestration; to mobilise the financial resources and make it accessible for expanding activities in technology development and transfer and capacity building for the formulation, implementation, monitoring and evaluation of programmes;
- c) To implement adaptation programmes according to the national development agenda and to ensure at least 80 percent of the total funds available for climate change activities flow to the grassroots level;
- d) To make natural resources management climate-friendly for socio-economic development and climate-resilient infrastructure development;

6.2.4 Adopted Policies

i. Climate adaptation and disaster risk reduction

- Implementing priority actions identified in the National Adaptation Programme of Action (NAPA), and identifying and implementing medium- and long-term adaptation actions in the climate impacted and climate-induced disaster-prone areas, communities, and people;
- Linking and implementing climate adaptation with socio-economic development and income-generating activities to the extent possible;

- Monitoring the status of glaciers and glacier lakes through studies and implement adaptation activities in priority vulnerable glaciers;
- Forecasting water-induced disasters and risks created from climate change and providing early warning information, developing necessary mechanism for the implementation of preventive measures and ensuring regular supervision, and enhancing capacity;

ii. Low carbon development and climate resilience

- Adopting a low carbon emissions and climate-resilient development path for sustainable socio-economic growth;
- Formulating and implementing the necessary strategies, guidelines and working procedures to support a socio-economic development that is climate-friendly and resilient;
- Expanding the scope of carbon sequestration through scientific management of the forests, formulating and implementing land use plans and controlling deforestation;
- Reducing GHG emissions through additional development and utilization of clean, renewable and alternative energy technologies and formulating and implementing plans to address adverse impacts of climate change;
- Providing incentives to develop appropriate technology, its transfer and utilization for reducing the emissions of air pollutants, at source, that increase the atmospheric temperature;
- Auditing the energy intensity of industries every two years to promote energy efficiency and submitting the audit to the designated authority for climate change;

iii. Access to financial resources and utilization

- Establishing a Climate Change Fund for mobilizing the financial resources from public and private, internal and external sources to address the issues of climate change.
- Generating financial resources by promoting carbon trade and Clean Development Mechanism;
- Generating financial resources through the implementation of the "polluter pays principle" and the payment for environmental services concept;
- Managing the financial resources from current and future multilateral and bilateral support for climate change activities and the Climate Change Fund;
- Utilising the benefits accrued from mechanisms for mitigating and adapting to climate change and for reducing poverty and promoting sustainable development;

iv. Capacity building, peoples' participation and empowerment

- Updating information and building capacity from local to policy level on climate adaptation, impact mitigation, low carbon growth, technology development and transfer, and carbon trade;
- Ensuring the participation of poor people, *Dalits*, marginalized indigenous communities, women, children and youth in the implementation of climate adaptation and climate change-related programmes;
- Implementing local climate change-related programmes through local institutions by enhancing their capacity;

v. Study and research

- Conducting climate change-related research to expand the implementation of measures for adapting to adverse impacts and benefiting from positive impacts;
- Establishing and maintaining a state-of-the-art database of sector- and theme-based research knowledge, data and reports;
- Preparing and utilizing regional climate models and other models for research;

vi. Technology development, transfer and utilization

vii. Climate-friendly natural resources management

6.3 Climate Change Impacts in NAPA Districts

6.3.1 Climate Change Issues in VDCs of Dang District

Dang district is in Mid-western development region of Nepal. There is mixed type of topography and climate. 20% VDCs are in plain land structure and rich in agriculture production mainly paddy production. There is access of irrigation facility, road networks and market places. Remaining VDCs are slightly in rural areas and peoples are facing problems of agriculture production and other physical facilities.

NAPA is prioritizing 4 VDCs of Dang districts to conduct climate change impact mitigation actions and programmes. Out of 4 VDCs, Bela lies in the southern part of district and has plan land structure containing of irrigation facilities and average agriculture production and other 3 VDCs are slightly in rural areas. People are facing different problems in these rural VDCs. Research was conducted in all 4 VDCs and climate change issues are identifies by field based visits, FGDs, stakeholders consultation, interview with key persons and meetings with governmental bodies, NGOs and other related organizations. Local problems are found under following sectors and immediate adaptation actions are required.

- Agriculture and food security
- Deforestation, landslides and fire hazards
- Water resource and energy crisis
- Human resource and capacity development
- Climate- induced disaster and physical planning
- Agriculture livestock and local market management
- Gender discrimination and social development

6.3.2 Most Urgent and Immediate Adaptation Actions

VDCs	Local Problems addressed	Adaption Actions
Bagmare	Agriculture and food security, forestry and infrastructures	Compost preparation, terrace improvement, drip irrigation, nursery, wetland conservation, embankment (streamside protection), gully control, bio-engineering, irrigation canal maintenance, pond construction and conservation, water tank construction /maintenance
	Water resources and energy	Water source maintenance, improved stove, gobar gas
	Capacity enhancement	Agricultural training, awareness on forest fire and climate change, hoarding board, ghumti fund, emergency fund
	Gender Capacity	Skill development and leadership, climate information, skill development adaptation classes, capacity enhancement programme
Bela	Climate- induced disaster and physical planning	Embankment, super construction and bio-engineering, drip boring, shallow tube well, pond construction, wetland conservation, new wells and tap water maintenance
	Agricultural and livestock development, and forest management	Seed collection centre, agriculture and livestock disease control, forest fire control,
	Human resources and capacity	Training on forest management, agriculture and

	enhancement	veterinary, improve stove and biogas, awareness raising including on health, health camp, climate change seminar, emergency fund establishment, and LAPA monitoring
	Gender Capacity	Skill development and leadership, climate information, skill development , adaptation classes, capacity enhancement programme
Goltakuri	Agriculture and food security, forests and biodiversity, climate-induced disaster and physical planning	Terrace improvement, drip irrigation, nursery establishment, wetland conservation, shallow tube-well, irrigation canal maintenance, pond construction and conservation, shallow tube-well, irrigation canal maintenance, pond construction and conservation, water tank construction and maintenance, stream-side protection. Embankment, gully control, bio-engineering
	Water resources and alternative energy	Improved stove, biogas
	Human resources and capacity enhancement	Training on agriculture, compost-making, fire control, school health, health camp, hoarding board, ghumti kosh, emergency fund and LAPA monitoring
	Gender capacity	Skill development and leadership, climate information, skill development, adaptation classes, capacity enhancement programme
Hansipur	Water source protection and flood/landslide control	Water source protection, rainwater collection in tank, drinking water project, embankment/spur construction, bio-engineering
	Forest management, agriculture and livestock development	Forest road construction, nursery establishment, agriculture and livestock disease control,
	Income generation and alternative energy	Ghumti kosh, emergency fund, biogas, electricity export from jhumuk stream
	Human resources and capacity enhancement	Training on forest management, IPM SRI technical support, sanitation, healthclinic, climate change awareness etc.
	Gender capacity	Skill development and leadership, climate information, skill development, adaptation classes, capacity enhancement programme
Rajpur	Infrastructure and climate-induce disaster	Irrigation canal maintenance, new well construction, tap maintenance, embankment, spur and bio-gas
	Forest and Biodiversity, water resources and energy	Fire line development, biogas
	Human resources and capacity enhancement	Training on agriculture and veterinary and improved stoves, awareness seminar, sanitation, health camp, emergency fund establishment, climate change training, seminar, and LAPA monitoring
	Gender Capacity	Skill development and leadership, climate information, skill development, adaptation classes, capacity

	enhancement programme
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7. Conclusion and Recommendations

After intensive field based study and national program review regarding to climate vulnerability in Dang district, different issues are found due to climate change and variation in precipitation. Terai VDCs of Dang have climate induced disasters such as flooding and landslide problems in slope land areas. Draught is another problem faced by farmers which reduce the productivity of land. Gender discrimination is also found in rural and marginalized communities of some VDCs. Study will recommend following intervening programmes to develop climate change resilience capacity in communities.

- ✓ Development of physical infrastructures like access roads, electricity and local market infrastructures
- ✓ Full fill demands of fertilizers to farmers on time which help to increase high production of rice
- ✓ Develop physical infrastructure like embankment and check dams to control flooding
- ✓ Forest management program and control mechanism of degradation of forest resources
- ✓ Awareness development in community with skill development programmes mainly in poor and marginalized groups such as *dalits* and *janajati*.
- ✓ Long term program through coordination with district based organizations, local CBOs and private social development organizations.

Annexes:

Annex 1: Demographic and Climatic Information

Annex 2: Photographs

Annex 1: Demographic and Climatic Information

Table 1: Basic Demographic Data

SN	Parameters	District Population	National Population
1	Total Population	462,380	23,151,423
2	Female Population	233,422	11,587,502
3	Male Population	228,958	1,563,921
4	Sex Ration	98.09	98.80
5	Households	82,495	4,253,220
6	Family Size	5.60	5.4
7	Annual Growth Rate	2.66 %	2.25
8	Doubling Time	26 years	31
9	Density	156 per sq. KM	157
10	Urban Population	16.65 %	14.2
11	Rural Population	83.35 %	85.8
12	Literacy Rate	58 %	

Source: District Profile 2005/CBS 2001

Table 2: VDC level Population Data

SN	VDC	Households	Total Population	Male Population	Female Population
1	Bagmare	1308	7194	3537	3657
2	Hansipur	1233	7091	3383	3708
3	Bela	1566	9478	4771	4607
4	Rajpur	1956	12086	6192	5894
5	Goltakuri	931	5285	2553	2732

Source: CBS 2001

Table 3: Average Climatic Data

SN	Months	Max. Temperature	Min. Temperature	Precipitation
1	January	20.5	5.4	53
2	February	23.5	9.1	-
3	March	30.8	15.0	-
4	April	32.4	18.9	41.7
5	May	33.9	20.7	134.8
6	June	31.7	21.2	124.7
7	July	30.2	21.8	422.7
8	August	30.9	21.8	256.2
9	September	30.4	20.4	198.2
10	October	28.6	13.9	85.3
11	November	25.7	8.9	1.6
12	December	23.5	9.1	-

Source: Monsoon and Climate Measurement Station, Dang

Annex 2: Photographs

	
<p><i>FGD with local CBO members</i></p>	<p><i>Media news of flooding in Koshi River</i></p>
	
<p><i>Less volume of water during winter season</i></p>	<p><i>Rice plantation in Bela VDC</i></p>
	
<p><i>Flooding in Rapti River</i></p>	<p><i>Gabion wall in Babai River</i></p>

Source: Field Report, RSN