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Climate change screening of Danish development cooperation with Nepal

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Preface

A climate change screening of the Danish development cooperation with Nepal was carried out from 6-14 March 2008 in collaboration with relevant authorities of the Government of Nepal and the Embassy of Denmark.

The climate change screening was carried out in accordance with the Danish Climate and Development Action Plan (2005). Further details are included in the Danida Terms of Reference (dated 4 February 2008). Reference is furthermore made to the Preparation Note (dated 21 February 2008) and the briefing note (dated 18 February 2008) to inform about the climate change screening in Nepal.¹

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A draft report (20 March 2008) was prepared for comments. A previous draft was prepared during the climate change screening in Nepal and presented at a debriefing with the Embassy of Denmark in Kathmandu on 14 March 2008. The final climate change screening report was prepared after comments are received from the Embassy of Denmark.

The views and recommendations in the draft report are those of the team, and may not necessarily coincide with views and policies of the Embassy of Denmark or the development partners in Nepal.

¹ See: <http://ccs-asia.linddal.net>

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Abbreviations

ADB	: Asian Development Bank
AEPC	: Alternative Energy Promotion Centre
AMG	: Aid Management Guidelines (of Danida)
BSP	: Biogas Support Programme (of Nepal)
CCA	: Climate Change Adaptation
CCN	: Climate Change Network
CCNN	: Climate Change Network Nepal
CDCF	: Community Development Carbon Fund
CDM	: Clean Development Mechanism (of the Kyoto Protocol)
CEN	: Clean Energy Nepal
CER	: Certified Emission Reduction (of CO ₂ e in CDM)
CO ₂ e	: Equivalents of CO ₂
COP	: Conference of the Parties (of UNFCCC)
CRU	: Climate Research Unit
Danida	: Danish International Development Assistance
DfID	: Department for International Development Cooperation (of United Kingdom)
DHM	: Department of Hydrology and Meteorology (of GoN)
DHS	: Department of Health Services (of GoN)
DJF	: December, January, February
DKK	: Danish Kroner
DNA	: Designated National Authority (for CDM of Kyoto Protocol)
DPNet	: Disaster Preparedness Network
DRR	: Disaster Risk Reduction
DWIDP	: Department of Water Induced Disaster Prevention
EIA	: Environmental Impact Assessment
ENPHO	: Environment and Public Health Organisation
ENSO	: El Niño Southern Oscillation
EOD	: Embassy of Denmark
EPC	: Environment Protection Council
ERPA	: Emission Reduction Purchase Agreement
ESAP	: Energy Sector Assistance Programme
ESAT	: Education Sector Advisory Team
EU	: European Union
GCM	: General Circulation Models
GEF	: Global Environment Facility
GHG	: Greenhouse Gases
GLOF	: Glacial Lake Outburst Flood
GoN	: Government of Nepal
HUGOU	: Human Rights and Good Governance Programme (of Danida)
I/NGOs	: International Non-Governmental Organisation
ICIMOD	: International Centre for Integrated Mountain Development
ICS	: Improved Cooking Stoves
IEA	: Initial Environmental Assessment
INC	: Initial National Communication (to UNFCCC)
IPCC	: Intergovernmental Panel on Climate Change

JICA	: Japan International Cooperation Agency
JJA	: June, July, August
kW	: Kilo Watt
LDCF	: Least Developed Countries Fund (of UNFCCC and GEF)
LEG	: Least Developed Countries Expert Group
LGP	: Length of Growing Period
m.a.s.l.	: Meters above sea level
MFSC	: Ministry of Forests and Soil Conservation
MoES	: Ministry of Education
MoEST	: Ministry of Environment, Science and Technology
MoHA	: Ministry of Home Affairs
MOPE	: Ministry of Population and Environment
MS	: Mellempfolkeligt Samvirke (Danish NGO)
MW	: Mega Watt
NAPA	: National Adaptation Programme of Action (of UNFCCC)
NARMSAP	: Natural Resource Management Sector Assistance Programme
NCSA	: National Capacity Self Assessment
NGO	: Non-Government Organisation
NPC	: National Planning Commission
NRs	: Nepali Rupees
NSDRM	: National Strategy for Disaster Risk Management
ODA	: Official Development Assistance
PAP	: Process Action Plan
PIN	: Project Idea Note
PREGA	: Promotion of Renewable Energy Greenhouse gas Abatement
REDD	: Reduced Emissions from Deforestation and Degradation (REDD)
REDP	: Rural Energy Development Programme
SAARC	: South Asia Association for Regional Cooperation
SBSTA	: Subsidiary Body for Scientific and Technological Advice (of UNFCCC)
SDMC	: Disaster Management Centre (of SAARC)
TAL	: Terai Arc Landscape (of WWF Nepal)
UMKC	: MFA competence centre (in Danish)
UN	: United Nations
UNDP	: UN Development Programme
UNEP	: UN Environment Programme
UNFCCC	: United Nations Framework Convention on Climate Change
USD	: United States Dollars
VER	: Voluntary Emission Reductions
WHO	: World Health Organisation
WMO	: World Meteorological Organisation
WWF	: Worldwide Fund for Nature

Executive Summary

Danida Climate Change Screening

Denmark has initiated a climate change screening of the Danish international development assistance (Danida) in all development cooperation partner countries. The Danish Climate and Development Action Programme (August 2005) requires that potential impacts and risks of climate change to Danish development cooperation are assessed (*climate screening*).

Danida currently is providing support to the Government of Nepal (GoN) in the Renewable Energy Sector, the Education Sector, and within Good Governance and Human Rights. There is interest in ensuring that risks from climate change will be addressed whilst designing and implementing the Danish development cooperation in Nepal (*climate proofing*). There is also a desire to identify opportunities for contributions to a reduction of vulnerability to climate change in Nepal within current development cooperation or as additional climate change related interventions

The outcome of the climate change screening is improved effectiveness of Danish development cooperation in Nepal through informed choices on adaptation to climate change and climate variability. The consequences of climate change can be addressed by reducing vulnerability and improving adaptation. The climate change screening of the Danida sector programmes will briefly include assessments of activities related to mitigating greenhouse gas emissions, e.g. in relation to energy production and use. The climate change screening is integrated with the Danida action plan on Disaster Risk Reduction.

Climate change scenarios, risks and vulnerability

There are climate variations mainly in the monsoon and extreme weather events in Nepal. Currently there are impacts on the glaciers and attention is also on the glacial lake outburst floods (GLOF). Future climate change will have potential impacts on development and livelihoods in Nepal. The impacts will be felt particularly in the agriculture, forestry, energy, infrastructure and health sectors. Recent modelling² provides some indication in the change in temperature and precipitation for the period 2040-2069 in Nepal:

- The temperature will increase and cause a warming over the entire country. The warming will be relatively higher in the north at higher altitude during winter with a change of 3.3°C and higher in the west during monsoon with a change of 2.3°C. The rate of temperature increase is greater in higher altitudes and in the winter.
- The precipitation will decrease in all regions and seasons except for a slight increase in the northwest during the monsoon. The decrease will mainly be during the monsoon in eastern Nepal with lesser decrease during winter.

As a least developed country, Nepal's development may be sensitive and will be vulnerable to further changes in weather patterns. The impacts are more from extreme weather events than from changes in the averages. The vulnerability is due to the impacts of the climate but vulnerability is compounded with other impacts related to governance, natural resources management and other challenges to sustainable development.

² Shrestha (2008): RegCM3

Climate change policies and institutions in Nepal

Nepal signed the UN Framework Convention on Climate Change (UNFCCC) in June 1992. The UNFCCC entered into force in Nepal in July 1994. The Kyoto Protocol entered into force in Nepal in December 2005. The Initial National Communication to UNFCCC was prepared in July 2004. The formulation of the Second National Communication has not yet been initiated. Funding from UNDP / GEF has recently been approved for the preparation of the National Adaptation Programme of Action (NAPA). There is ongoing work to prepare a Climate Change Policy for Nepal.

The focal point for climate change is the Ministry of Environment, Science and Technology (MoEST). MoEST is also the Designated National Authority (DNA) of the Kyoto Protocol. The Government of Nepal has formed a loose coordination forum, the Climate Change Network (CCN). The CCN is chaired by the Secretary of the MoEST and is mainly activated as an advisory forum before and after having the COP meetings of UNFCCC.

Ministry of Home Affairs (MoHA) is National Focal Agency responsible for coordination of all aspects concerning disaster management, response and preparedness. Disaster management focal points have been nominated in key line agencies.

Donor harmonisation and coordination

Harmonisation with donor partners is a key priority of Denmark's development cooperation. The recommendations and follow-up will be developed in close collaboration with stakeholders including other donors in the concerned sectors. There is a donor coordination group on 'Environment'. An informal donor meeting on climate change was held on 13 March 2008. This was the first of its kind on climate change and follow-up meetings are scheduled. A second meeting was held on 13 May 2008.

The Climate Change Network Nepal (CCNN) has been established at the initiative of WWF Nepal, Winrock and other stakeholders and includes nine members working on climate change. CCNN is different from the CCN mentioned above.

Findings on climate risks and vulnerability in Nepal

The findings and recommendations are those of the climate change screening team. These are for further discussion with the EOD and the Danida development partners in Nepal.

- Nepal is already affected by climate variability and extreme weather events resulting in hazards such as floods and landslides. With future climate change and risks of increase in magnitude and frequency of extreme weather events, the vulnerable Nepali population is likely to be faced with greater climate risks. The ability to address climate-related extreme events today is an indication of the ability to address such events in the future.
- The main climate-related risks and thus priorities for action in Nepal are: (i) the GLOFs with potential impacts for hundreds to thousands of people; (ii) impacts on livelihoods and economy from extreme weather events due to changes in Monsoon and Western Disturbance weather systems with impacts for millions of people; (iii) consequences for economic sector like hydropower and agriculture; and (iv) derived longer-term consequences on health (food security, and water and vector-borne diseases).

- Climate change risks are noted by the GoN and the donors but currently have a relatively low priority due to the on-going peace and democratisation process and overall post-conflict situation. Disaster management has got some priority, but further attention to climate change risks could be brought into the development process together with disaster risk reduction.
- The vulnerability to climate change is a result of both climate related and socio-economic events. In 30 years, when more severe climate change is expected the current population of Nepal of about 26 million may have doubled at the current population growth rate of 2.5 % *p.a.* (or double within 40 years with a 1.7 % *p.a.* population growth rate). With pressure on natural resources and available land, the exposure and vulnerability to climate change risks may increase.
- Preventive measures for adaptation to climate change and disaster risk reduction require inter-sector and inter-agency coordination and collaboration, which is only partly in place. The identification of urgent adaptation needs should be addressed in the forthcoming National Adaptation Programme of Action (NAPA).
- A key gap in policy formulation is the articulation of the consequences of climate change and climate variability to livelihoods and economic development. A first step to overcome this deficiency is to narrow the uncertainty by improving the quality and timing of climate-related information ranging from short-term forecasting of extreme weather events to developing longer-term climate change scenarios.
- Climate risk information generation and application to climate-sensitive sectors have not yet been institutionalised in Nepal. The cross-sectoral influence of climate change requires a higher degree of inter-sectoral coordination and collaboration.

Findings about development cooperation and climate change

- The Danida development cooperation with Nepal is not at direct risk from climate change. The only area of possible concern may be the climate risks on the investments in renewable energy, e.g. structural impacts from floods, and the availability of water for micro-hydropower and biomass for energy.
- The Energy Sector Assistance Programme (ESAP) is already implicitly addressing climate change by supporting renewable energy alternatives for a low-carbon development path.
- Donors and I/NGOs are concerned about climate change but few activities have been initiated on climate change adaptation. There is a broad interest in mainstreaming climate change risks and vulnerability in development programmes and projects. The level of donor coordination on climate change has been low but is growing. It will be relevant to bring climate change issues into several sectors.
- There has been relatively good progress on developing carbon finance through the Clean Development Mechanism (CDM) from mitigation projects, but the overall potential may be limited for Nepal.

Recommendations for follow-up by Embassy of Denmark

1. **Mainstreaming climate change:** When appropriate, the EOD should seek to include climate change risks and adaptation in annual consultations, annual programme reviews and when

identifying and designing future sector programme support, e.g. in programme concept notes. EOD can make use of entry points for addressing climate change outlined in the Danish Climate and Development Action Programme. (No additional costs).

2. **Climate change and disaster risk reduction focal point:** Further formalise and continue to provide adequate support for a Climate Change and Disaster Risk Reduction focal point at the EOD. Include the functions of the focal point in the job description. Attend regional Danida course on climate change and development expected to be arranged by the MFA Competence Centre (UMKC). (No additional costs).
3. **Donor harmonisation:** When appropriate the EOD should include climate change risk, adaptation to climate change in the development process and promotion of a low-carbon development path at the various groups for donor coordination. (No additional costs).
4. **Documentation of relevance of ESAP to address climate change:** Some effort could be made to document the existing efforts to promote renewable energy supply and improved livelihoods. Although not by design, ESAP is an exemplary case of a Danida programme that is already addressing issues related to climate change (Limited additional costs from ESAP).
5. **Co-financing of NAPA preparation:** It is recommended that the EOD should be open for a request from MoEST and UNDP for a co-financing of the preparation of the NAPA. The co-financing can be managed by UNDP and shall ensure that NAPA preparation has resources for consultations, is integrated with development plans and related sector plans and disaster management, and can be completed in a shorter time frame. The emphasis is on initiating small pilot activities in order to fast-track implementation of adaptation activities. GEF has provided USD 200,000 for the NAPA preparation and it is suggested that Danida provides an equal amount. (Funding of up to DKK 1,000,000 from additional Danida climate change funding).
6. **Co-financing of improved climate data collection and management at DHM:** It is recommended that the EOD could be open for a request from DHM (MoEST) for co-financing of assistance for improved climate data processing capabilities to enable generation of user-friendly climate risk information for decision making purposes to reduce the uncertainty of climate change risks and vulnerability. (Funding of up to DKK 2,000,000 from additional Danida climate change funding).
7. **Co-financing of baseline assessment of CDM or VER projects in renewable energy:** Alternative Energy Promotion Centre (AEPC) made a request for technical assistance to develop baseline scenarios³ for CDM projects in renewable energy mainly concerning micro-hydropower and other renewable energy, e.g. for programmatic CDM. This support will help reduce a key obstacle to development of CDM projects and thus potentially unleash future CDM carbon finance to replace ODA for investments. It is recommended that the EOD could be open to a request from AEPC (MoEST). The technical assistance should preferably not be stand-alone but part of a co-financing of support to facilitate CDM carbon finance. (Funding from ESAP budget or from up to DKK 1,000,000 from additional Danida climate change funding)

³ For Nepal to benefit from CDM, studies of possible baselines (and approval of these by the Executive Board in Bonn) are needed to support private sector applications for Certified Emission Reductions. The challenge is that Nepal use hydropower extensively and only inclusions of possible import from neighboring China and India can create an attractive baseline for CDM. As lack of funds for investments are evident the scenario is not that unlikely. Before India and China starts producing electricity from coal to export to Nepal, financing for exploitation of the hydro power potential in Nepal should be made available, and CDM could be one of the measures.

8. **Preparation for COP 15 and post-2012:** Support the MoEST to coordinate the development of the GoN position on the successor to the post-Kyoto framework at the 15th Conference of the Parties (COP) to the UNFCCC to be held in Copenhagen in 2009. This may include organising pre- and post- COP meetings with the climate change forum or similar in Bhutan from COP 14 onwards, coordinating positions with other LDC countries, developing a position on a reform of CDM rules for LDCs including the role and eligibility of forest conservation and supporting COP 15 attendance by additional relevant Government and non-government representatives (up to DKK 1,000,000).
9. **Climate footprint of Danida activities in Nepal:** the EOD could consider the ‘*climate footprints*’ of the Danida operations in Nepal ranging from energy efficiency assessment of the Embassy, use of generators for electricity back-up in projects and residential areas, options for use of renewable energy in projects and residents, means of transportation, consumption of petrol, and fuel efficiency of purchased vehicles. The EOD can have interaction with Winrock and CARE-Nepal regarding the assessment of the “Climate footprints” and the Danida Representation in Phnom Penh, Cambodia.

The current Danish cooperation with Nepal is underpinned by an Interim Country Strategy. A revised Country Strategy for the Danish development cooperation with Nepal including sector emphasis will be further decided after the end of the Constitution Assembly period has been completed by 2009 or later. At this stage it will be feasible to address climate change adaptation in future programmes.

There will be further attention on the reduced emissions from deforestation and degradation (REDD) in Nepal. This may be a further opportunity should Danida enter into future activities in natural resource management in Nepal.

1. Introduction to Climate Change Screening

The impacts of climate change are looming and will alter the conditions for the global economy and local livelihoods in forthcoming decades. Over the next decades, it is highly likely that countries and people will be adversely affected by climate change. In particular developing countries and the poor are vulnerable and may face larger water shortage, food insecurity and greater risks to health and life as a result of climate change (IPCC, 2007).

Denmark has initiated a climate change screening of the Danish international development assistance (Danida) in all development cooperation partner countries. The Danida Climate and Development Action Programme (August 2005) requires that potential impacts and risks of climate change to Danish development cooperation should be assessed (*climate screening*). The purpose of the Danida climate screening is to ensure that risks from climate change will be addressed whilst designing and implementing the Danish development cooperation in Nepal (*climate proofing*).

The combined process of climate risk management and adaptation has been referred to as a *climate proofing* of the development cooperation, i.e. a climate change ‘*due diligence*’ (see Box 1).

Box 1: Climate change proofing of a development programme

The climate change screening with subsequent climate proofing and reduction of disaster risks is aiming at an adaptation to the risks, exposure and vulnerability of climate change in the design and implementation of development cooperation.

Now = The development programme portfolio (current and planned)

- + Climate change screening (identification of climate change risks and adaptation options)
- + Reducing risks of climate change (risk management, e.g. proper selection of the site for constructing a bridge if the area is highly prone to high rainfall)
- + Additional adaptation (further reduction of vulnerability, e.g. changes in selection of agricultural crops that adapt better to temperature increase in higher altitudes)

Future = A ‘climate proofed’ development programme portfolio (= improved aid effectiveness)

A climate proofed development programme portfolio should in principle achieve a similar development outcome as without climate change. There will, however, be additional costs of adaptation and management of the risks.

The climate change screening of development cooperation addresses the uncertainty of the future climate change, the climate variability and the potential vulnerability. Development cooperation may become less effective in achieving the development objectives without factoring in climate change risk, i.e. management and decision making should take the uncertainty about future climate change into account.

The key elements of the climate change risk screening include:

- Assessing the ways in which different vulnerable groups and sectors are likely to be affected by climate change in the medium to long term.
- Carrying out climate change risk assessment of the on-going and planned development cooperation portfolio, programmes and projects in the short term.

- Identifying opportunities for additional adaptation to reduce vulnerability to climate change within the development portfolio or with additional interventions.

The emphasis is on climate change adaptation (CCA) and the mainstreaming into development programmes with the aim to further support poverty reduction and sustainable development (*see* Box 2). It is noted that the objectives of development cooperation with reduction of poverty and sustainable development coincide with adaptation and reduced vulnerability even before factoring in climate change. Additional CCA may be required when the climate change risks are identified.

There is some overlap but also some differences in the policy response to CCA and Disaster Risk Reduction (DRR), although these agendas may not always be harmonized or institutionally coordinated (*see* Annex 4).

The purpose of this study is to address opportunities for contributions to a reduction of vulnerability to climate change in Nepal within current development cooperation or as additional climate change specific interventions. Danida currently is providing support to the Government of Nepal (GoN) in the Renewable Energy Sector, the Education Sector, and within Good Governance and Human Rights.

The outcome of the climate change screening is to improve the effectiveness of Danish development cooperation in Nepal based on informed choices on adaptation to climate change and climate variability. The negative consequences of climate change can be addressed by reducing exposure and vulnerability and through further adaptation.

The output of the assignment is a brief climate change screening report of the Danida supported sector programmes in Nepal. The climate change screening recommends potential adaptation and climate proofing of the Danida supported sector programmes. The report includes a Process Action Plan for follow-up of the proposed recommended activities by the Embassy of Denmark (EOD). The proposed activities to reduce the impacts of climate change may be accommodated at no additional budget within the current sector programs or from an additional climate change budget provided by Danida.

Box 2: Climate Change, Mitigation, Adaptation and Development

The UN Framework Convention on Climate Change has since its beginning emphasised mitigation of the emission of CO₂ and other greenhouse gases (GHG) to reduce future climate change. Mitigation requires international cooperation and commitment because GHGs are uniformly mixed in the atmosphere and thus global externalities, i.e. the location of the source of mitigation, is independent of the benefit from the reduction. It is recognised that although attention has grown on the impact of current climate variability, the major consequences of climate change will be felt beginning in few decades and until end of the century. Current mitigation is therefore urgent to reduce future climate change.

The major share of the mitigation will take place in developed countries, but the flexible mechanism like Clean Development Mechanism (CDM) under the UNFCCC's Kyoto Protocol make it possible to substitute mitigation, for example in Denmark, with mitigation in a developing country. If mitigation can be done at a lower cost, it will be possible to identify financing for investments in developing countries that will contribute to sustainable development.

The current mitigation efforts with or without CDM finance are probably insufficient to eliminate the potential risk of future climate change. It will therefore be relevant to adapt to a certain degree of future climate change as well. Developing countries are considered to be particularly vulnerable to climate change risks due to poverty, agricultural dependence, and low investment capacity. Unlike mitigation, adaptation is not a global externality, i.e. the benefits of adaptation can mostly be captured locally. A justification for external financing of adaptation in developing countries is that the problem of climate change is caused by the lifestyles and associated emissions of GHGs in developed countries.

Adaptation to climate variability already occurs today, e.g. through strategies to prepare for droughts or floods. Some adaptation takes place by individuals and the private sector, e.g. investment in irrigation facilities to reduce vulnerability to water scarcity. The need for additional capacity for adaptation is determined by the expected climate change risks and the vulnerability of exposure to such risks.

Adaptation can reduce vulnerability to anticipated climate change risks. Long-term investments, e.g. road infrastructure should consider the future flooding potential. Current development should avoid enhancing the risks, e.g. developing residential areas in low-lying coastal areas prone to flooding or adverse effects of extreme weather events. An adaptation strategy can also increase the capacity to prepare for anticipated climate change risks by addressing the overall development picture.

Although there are records from past weather events, the assessment of the impacts of climate change will be counterfactual without a reference baseline for a situation with no climate change. It is uncertain how much adaptation is required due to the uncertainty about the future impacts of climate change. One strategy is to seek adaptation measures that are 'no regrets', i.e. which will reduce vulnerability to climate but also are relevant for development objectives even with the known current climate.

It is increasingly recognised that adaptation to climate change is also an integral part of good development practice. The Stern Review noted that the foundation of the policy response in developing countries to climate change is that "*much of what governments should do in relation to adaptation is what they should be doing anyway – that is, implementing good development practice. This is key to reducing the vulnerability of developing countries to climate change and raising their capacity to adapt*" (Stern Review 2007, p.489).

Vulnerability to climate change is determined by factors that are mainly the same as those that development, seeks to address, e.g. wealth and resource inequality, gender and race discrimination and poor governance. Reversing these underlying factors will ultimately ensure that risks posed by climate change are not overwhelming, because they will build resilience to shocks of all sorts, hence also reducing vulnerability to climate change.

2. Climate Change Scenarios, Impacts, Vulnerability and Risks

2.1 Climate Patterns and Climate Variability

The climate in Nepal varies from sub-tropical to arctic in a span of about 200 km. The region features reveals prevalence of different types of climate in Nepal (*see* Table 1).

Table 1: Climatic Regions of Nepal⁴

Region	Elevation (m.a.s.l.)	Climate	Average Temp.
Terai	200	Humid tropical	>25°C
Siwaliks	200-1500	Moist subtropical	25°C
Middle Hills	1000-2500	Temperate	20°C
High Mountains	2200-4000	Cool to sub-alpine	10 to 15°C
High Himalayas	>4000	Alpine to arctic	< 0 to 5°C

Source: CST Nepal (1997).

Rainfall in Nepal is influenced predominantly by the southwest summer monsoon in the east and western disturbances in the west, along with altitude changes. Yearly rainfall totals increase as the altitude increases up to 3,000 meters, and beyond that decrease with increasing altitude and latitude. Almost 80% of the annual rainfall average of 1,900 mm occurs due to south west summer monsoon between June and September. However, the spatial variation of rainfall from near the arid Tibetan plateau to the moister Pokhara valley varies from 300 mm to 3,700 mm.

The temperature also varies seasonally and spatially from 40°C in the Terai to 28°C in the middle mountains during summer and from 7°C in the Terai to below freezing point in the hills during winter. This climate among other factors determines the livelihood patterns in rural Nepal (*see* Box 3).

Box 3: The Effect of Rainfall Uncertainty on Occupational Choice in Rural Nepal

Occupational choice in rural Nepal is mainly determined by the uncertainty associated with historical rainfall patterns. Where the head is employed in agriculture, other family members are less likely to choose agriculture as an occupation in areas where rain is uncertain. Despite the prevalence of agriculture as the main occupation in rural Nepal, evidence suggests that households strive to diversify their sources of income to insure total household income against aggregate weather shocks.

Source: Menon, Nidhiya, "The Effect of Rainfall Uncertainty on Occupational Choice in Rural Nepal" (March 2006). Available at SSRN: <http://ssrn.com/abstract=893194>

⁴ Adapted from Agrawala *et al.* (2003): 'Development and climate change in Nepal: Focus on water resources and Hydropower', OECD.

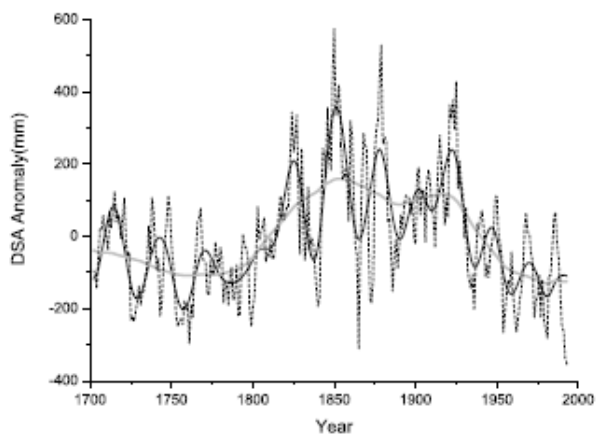
Climate Variability

Studies reveal that Nepal climate varies on different time-scales- epochal/decadal, inter-annual and intra-seasonal scales:

Epochal variability: 295 years of proxy-data from a Dasuopu ice core study⁵ (see figure) in Central Himalayas, shows the monsoon in central Himalayas had weakened in 18th century and strengthened throughout much of 19th and early 20th century, and then weakening again from early 1920s to the present.

Inter annual variability: El Niño Southern Oscillation (ENSO) is one of the major drivers for inter-annual variability. El Niño is associated with lower than normal rainfall and La Niña is associated with higher than normal rainfall, particularly in southern and middle regions of Nepal.

Intra-seasonal variability: the monsoon onset could be advanced by two weeks (first or second week of June) or delayed by about a month (i.e., to first or second week of July) in various regions of Nepal. The withdrawal of monsoon could also be three weeks earlier, i.e., first week of September or later (second week of October) than normal. The intensities and distribution of monsoon, during July-August also varies. This variability can affect the established patterns of socio-economic activities.



2.2 Observed Climate Extremes

Nepal's geophysical, geological, climatic conditions coupled with increasing and dense population and settlement patterns make it vulnerable to several natural hazards. Extreme precipitation events during monsoon and post-monsoon periods are common. Extreme rainstorms in the past 120 years (17-18 September 1880; 28-30 September 1924; and 19-20 July 1993) have been induced by abnormal behaviour of monsoon depression paths originating from Bay of Bengal when associated with low-pressure systems in Nepal⁶.

The peculiar recurvature of monsoon depression paths (1880, 1924) over Indian landmass towards Northwest caused heavy storm-related rainfall episodes in Nepal⁷. The meteorological situation of the 1993 storm was different from the synoptic situation of the recurve depression in that the origin was closer and followed a path all along Nepal, which in association with low pressure in Nepal, caused severe storms. No trends of behaviour of severe storms have been observed during monsoon season in Nepal.

⁵ Duan, Keqin and Yao, Tandong (2004) 'Low-frequency of southern Asian monsoon variability using a 295-year record from the Dasuopu ice core in the central Himalayas'.

⁶ Sharma, Keshab P., Department of Hydrology and Meteorology (DHM), Nepal

⁷ idem.

Land-use changes, urbanisation and other natural causes result in river course changing in many parts of Nepal, causing unprecedented consequences due to extreme weather events. Increase of agricultural lands and settlement at the expense of forest cover, along with other socio-economic drivers also predisposes Nepal to disasters in both frequency and intensity.

Box 4: Landslides in Nepal and increasing linkages with development

A database of landslide fatalities in Nepal compiled and analysed for the period 1978–2005 suggests that there is a high level of variability in the occurrence of landslides from year to year, but that the overall trend is upward.

Analyses of the trends in the data suggest that there is a cyclicity in the occurrence of landslide fatalities that strongly mirrors the cyclicity observed in the southwest (summer) monsoon in South Asia. Perhaps surprisingly the relationship is inverse, but this is explained through an inverse relationship between monsoon strength and the amount of precipitation in the Hill Districts areas of Nepal. It is also clear that in recent years the number of fatalities has increased dramatically over and above the effects of the monsoon cycle.

Three explanations are explored for this: land-use change, the effects of the ongoing civil war in Nepal, and road building. It is concluded that a major component of the generally upward trend in landslide impact probably results from the rural road-building programme, and its attendant changes to physical and natural systems.

At the same time, flood protection measures that do not adequately consider possible risks due to climate extremes, their magnitudes, and recurrence, also collapse resulting in greater damages. Check dams and embankments in the Butwal area (west Nepal) which were constructed after the 1970 floods collapsed in 1981 and 41 people, 120 houses, two mills and one bridge were swept away, while the collapse of check dams in the Rapti River in 1993 caused the loss of life of 24 people and damage to 2206 houses in Chitwan (central Nepal)⁸

Source: Trends in landslide occurrence in Nepal, David N. Petley, Gareth J. Hearn, Andrew Hart, Nicholas J. Rosser, Stuart A. Dunning, Katie Oven and Wishart A. Mitchell

Floods

Rainfall intensities of about 40-50 mm per hour are common in lower Mahabharat and Siwalik regions of Nepal. Several instances of rainfall of more than 400 mm in a 24-hour period have been recorded by Department of Hydrology and Meteorology (DHM) such as the 431 mm rainfall at Bajura in far-western region on 12 August 1980; 446 mm at Beluwa, in western region on 29 September 1981; 500 mm at Ghumtang in central region on 25 August 1968 and 473 mm at Anarmani in eastern region on 10 October 1959 (DHM, 1990). The maximum rainfall intensity of 88 mm per hour was recorded in 1989 at Pokhara in western region, while a rain intensity of 45 mm per hour on a steeply sloping watershed had initiated landslides and debris torrent on 29 September 1991 (Bhusal *et al*, 1993). However, with changing land use and other associated development activities, a lower threshold rainfall intensity (as low as 40 mm which are common during monsoons) could also result in damaging landslides and flash floods.

Major floods occurred in 1902/03 in Bagmati river, and 1964, 1981 and 1984 there were some flood events in the eastern region associated with Sunkosi river. Floods in Tinau in 1981 washed hectares

⁸ Chalise, Suresh Raj and Khanal, Narendra Raj, 'Recent extreme weather events in the Nepal Himalayas'

of fertile lands and took several lives, while the July 1993 floods devastated the Terai region killing 1336 people and affecting 487,534 people⁹ (see Box 5).

Similarly the 1998 floods and landslides that severely affected the Terai and Middle Hill region claimed 273 human lives, injured 80 people and killed 982 cattle, affecting 33,549 families, damaging 13,990 houses, ruining 45,000 hectares of land and agricultural crops resulting in a total loss of about NRs 2 billion.¹⁰

Box 5: Extreme Floods in SouthCentral Nepal in 1993

If scaled in loss of human lives, livestock, and infrastructure, the 1993 flood disaster is more severe than any other recorded flood in the past.

People were unaware of the looming flood and debris flows. Most of the villagers remained in their house hoping that the flood would recede as in earlier years. It was already too late by the time they had realised that the flood would wash them out. If the situation had been forecasted (warned), human losses would have been fewer.

Debris flows and landslides on the steep sloping terraces of a hilly region are so challenging that even a real time hydro-meteorological forecast system would fail to save lives. These events localize in short ranges with respect to time and distance in Nepal. Hence, unless people are aware themselves and avoid residing and building their houses in the risky areas, the mitigation of disaster resulting from landslides, debris flows, and flash floods would be costly and difficult.

Source: Bhusal, Jagat K. & Bhattarai, Kamal Prasad, “Lessons from the Extreme Floods in South Central Nepal in 1993”

The devastating floods in the low land areas and severe landslides in the hills during July 2002 affected 49 out of the country's 75 districts causing more than 445 deaths after leaving some 12,800 families homeless, and affecting over 300,000 people over a large and dispersed area.

Table 2: Spatial and temporal variation of peak flood flows in rivers in Nepal

Time of peak flows	Flood Magnitudes	Locations
July-August	Low	Central to eastern high mountains, high Himalayas and eastern middle mountains
	Intermediate- High	Western-central areas
August	Low	Far Western Nepal, Eastern basins
	Intermediate- High	Higher elevation of eastern-central and eastern Nepal
August-September	Low-Intermediate	Central middle mountains

Source: David M. Hannah, Sunil R. Kansakara, A.J. Gerrarda and Gwyn Rees: “Flow regimes of Himalayan rivers of Nepal: nature and spatial patterns”

Avalanche

Due to the high Himalayan Mountains in the north, avalanches are very common in Nepal. An avalanche in November 1995 killed 43 people including foreign trekkers at Khumbu and

⁹ Nepal country report, ADRC, ‘Disaster Management Policies, Problems And Measures : The Case Of Nepal’

¹⁰ *idem.*

Kanchanjungha areas. Over 170 people have been killed in 73 recorded instances of avalanches over a 33 year period from 1971 to 2003 in Nepal.¹¹

Table 3: Annual losses due to floods, landslides and avalanches in Nepal

Year	Death	Injured	Families affected	Livestock killed	Houses destroyed	Agricultural land (ha) affected	Loss of properties (Mi NRs)
1983	293	na	na	248	na	na	240
1984	362	na	na	3114	7566	1242	37
1985	420	na	na	3058	4620	1355	58.1
1986	315	Na	na	1886	3035	1315	15.85
1987	391	162	96151	1434	33721	18858	2000
1988	342	197	4197	873	2481	na	1087
1989	700	4	na	297	6203	na	28.61
1990	307	26	5165	314	3060	1132	44
1991	93	12	1621	36	817	283	21.2
1992	71	17	545	179	88	135	10.78
1993	1336	163	85254	25425	17113	5584	4904
1994	49	34	3697	284	569	392	59
1995	246	58	128540	1535	5162	41867.4	1419
1996	262	73	36824	1548	14037	6063.4	1186
1997	87	69	5833	317	1017	663.4	104
1998	273	80	33549	982	13990	326.89	969.27
1999	214	92	9769	331	2543	182.4	365
2000	173	100	15617	822	5417	888.9	932.1
2001	196	88	7901	377	3934	na	251.1
2002	441	265	39309	2024	18181	10077.5	418.91
2003	232	76	7167	865	3017	na	234.78
2004	131	24	14238	495	3684	321.82	219.28

Source: DWIDP, 2004 and Ministry of Home Affairs. (na= not available).

The above numbers indicate that the number of lives lost due to extreme events is decreasing but at the same time the numbers of families affected, agricultural areas impacted and monetary damages are steadily increasing. This shows that while the exposure and even the vulnerability is increasing, the systems and institutions have been able to limit casualties but not so successful in reducing risks or preventing increasing impacts on livelihoods.

Glacial Lake Outburst Flood (GLOF)

In the Himalayan region of Nepal glacial lakes are common. A total of 159 glacial lakes have been found in Koshi basin and 229 in Tibetan Arun basin. Among them 20 are potentially dangerous as

¹¹ Desinventar data (1997-2003), MOHA-NSET-UNDP Nepal

these lakes contain huge volumes of water and remain in an unstable condition, and can burst any time damaging life and property. Fourteen such glacial lake outburst floods have already been experienced from 1935 to 1998, with the last one occurring in Sabai Thso, Dudh Koshi on 3 September 1993.

Box 6: Glacial Lake Outburst Floods (GLOF)

The retreat of glaciers in the Himalaya is a result of higher temperatures, increased run-off, and lesser precipitation during winter time in higher altitudes. As the glacier retreats the depression made and occupied by glacial ice becomes filled with water in a glacier lake. The moraine walls holding the water that act as dams are structurally weak and unstable and can collapse either by itself, an earthquake, due to a landslide into the lake or a break-off of ice from the remaining glacier. The result is a glacial lake outburst flood (GLOF). The sudden release of a huge amount of lake water that rushes along the stream channel with high energy and mixed with earth and debris is a destructive flood wave.

A GLOF is not a new event in Nepal but may become more frequent with climate change. In July 1985 the Dig Tsho GLOF was caused by the detachment of a large ice mass from the Langmoche glacier. Within 4-6 hours 6-10 million m³ of water and mud was released into the Langmoche valley in Khumbu. The flood water surged 10-15 meters and the impact was felt 90 km downstream. The GLOF brought devastation to people, villages, livestock and agricultural land, and it destroyed the recently completed USD 1.5 Million Namche Hydropower Plant in the Khumbu region. As a result the Government of Nepal now increasingly consider GLOFs as a threat to development of water resources.

There may be more than 2,300 glacial lakes in Nepal and 20 of these (1%) have been identified as potentially at risk. Early warning systems and draining of the potentially risky glacial lakes are some of the precautions. These issues are part of National Disaster Management but shares same objectives as a climate change adaptation.

Source: WWF (2005): “*An Overview of Glaciers, Glacier Retreat, and Subsequent Impacts in Nepal, India and China*”, WWF Nepal Program, September 2005

Windstorm, Thunderbolt and Hailstorm

Windstorms occur mainly during the dry season between March and May. Electrical storms occur during the monsoon and hailstorms take place during the beginning and end of the monsoon. Hailstorms cause heavy losses of agricultural crops, though human life loss is rare. Windstorms and electrical storms cause the loss of human life as well as physical property, e.g. 23 people were killed in 1998.¹²

Drought

Uneven and irregular monsoon rainfall causes drought across many parts of Nepal. The mountainous region (the northern belt) of Nepal is generally dry. The lack of irrigation facilities makes the problem even more serious as the prolonged drought has adverse effects on crop production. The drought of 1994 affected 35 districts of the country. Agricultural crops cultivated on 157,628 hectares of land were destroyed.¹³

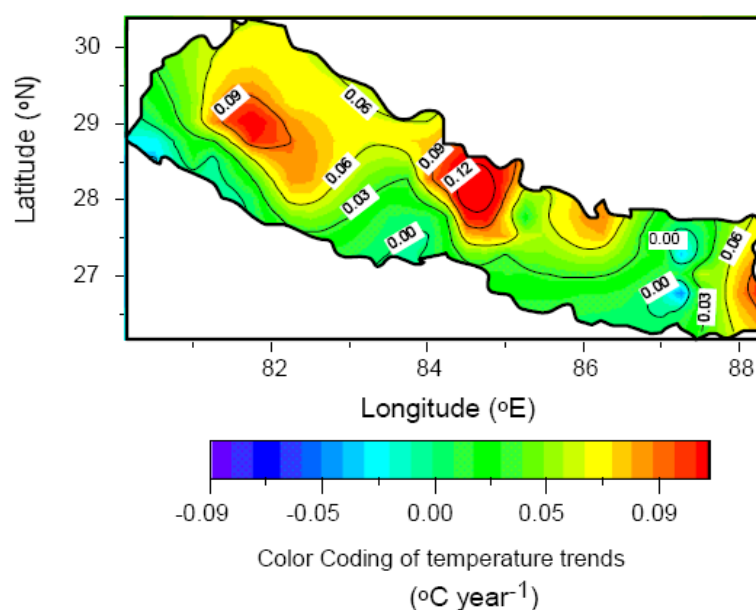
¹² Nepal country report, ADRC, 1999

¹³ idem

2.3 Observed Climatic Trends in Nepal

Temperature

Records of the last 30 years indicate that temperatures in Nepal are increasing and the warming seems to be consistent and continuous after the mid-1970s. The average annual warming between 1977 and 1994 was $0.06^{\circ}\text{C}/\text{yr}$.¹⁴ The warming is more pronounced at higher altitude regions of Nepal and significantly lower or lacking in the Terai and Siwalik regions. Warming in winter is more pronounced compared to other seasons.



Precipitation

Similar analysis on precipitation data, however, does not reveal any significant trends though oscillatory characteristics are present in the precipitation series.¹⁵ Similar to temperature, precipitation in Nepal is found to be influenced by or correlated to several large-scale climatological phenomena including El Niño Southern Oscillation (ENSO), regional scale land and sea-surface temperature changes and extreme events such as volcanic eruptions.

2.4 Climate Change Projections

More recent modelling (Shrestha, 2008) on RegCM3, with downscaling of climate change impacts for Nepal provides some indication of the change in temperature and precipitation for the period 2040-2069:¹⁶

- Temperature will increase and cause warming that will be distributed over the entire country. The warming will be relatively higher in the north at higher altitude during winter with a change of 3.3°C and higher in the west during monsoon with a change of 2.3°C . The rate of temperature increase will be higher in the winter than in the monsoon.
- Precipitation will decrease in all regions and seasons except for a slight increase in the northwest during the monsoon. The main decrease will be during the monsoon in eastern Nepal and lesser decrease during the winter.

¹⁴ Shrestha *et al.* 1999

¹⁵ Shrestha *et al.* 1999

¹⁶ This model utilized only the few available CRU stations for Nepal. Model results show some bias in temperature and overestimate rainfall in most part.

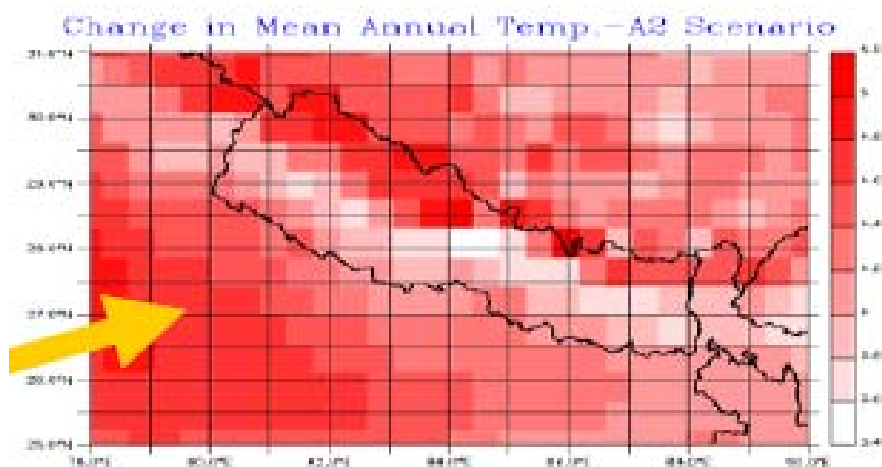
These results differ somewhat from the MAGICC/SCENGEN analysis which predicts an increase in monsoon precipitation. The Organization for Economic Co-operation and Development (OECD)'s best seven GCM General Circulation Models (GCMs) run with the SRES B2 scenario projected significant and consistent increase in temperature for Nepal for the years 2030, 2050 and 2100 (Agrawala *et al.* 2003). This analysis also shows somewhat greater warming in winter months than in summer.

Table 4: GCM Estimates for temperature and precipitation changes in Nepal

Year	Temperature change (°C) mean (standard deviation)			Precipitation change (%) mean (standard deviation)		
	Annual	DJF	JJA	Annual	DJF	JJA
Baseline average				1433mm	73mm	894mm
2030	1.2 (0.27)	1.3 (0.40)	1.1 (0.20)	5.0 (3.85)	0.8 (9.95)	9.1 (7.11)
2050	1.7 (0.39)	1.8 (0.58)	1.6 (0.29)	7.3 (5.56)	1.2 (14.37)	13.1(10.28)
2100	3.0 (0.67)	3.2 (1.00)	2.9 (0.51)	12.6(9.67)	2.1 (25.02)	22.9 (17.89)

Source: MAGICC/SCENGEN analysis for Nepal

Temperature Change Projection for Late 21st Century¹⁷



The PRECIS model has projected a rise in temperature by the end of 21st century for Nepal, mostly in the northern (higher altitude) regions.

The trends in climate change for Nepal are that the current average differences in temperature and precipitation between winter and summer, highlands and lowlands and east and west Nepal will become less. There is no model information regarding climate variability and whether reduced average precipitation in the monsoon could lead to reduced flood risks or fewer weather extremes.

¹⁷ PRECIS model output run at IITM, India. (The figure is in color and it is not readable in black print).

2.5 Potential Climate Change Impacts

Some of the most important impacts presented in the Initial National Communication of Nepal to the UNFCCC are given below:¹⁸

Agriculture

There is a very strong linkage between monsoon activity and agricultural productivity. Extreme events such as rainfall causing flooding and landslides, droughts, heat stress, hot winds, cold waves, hailstones and snowfall are undesirable. In recent years, their frequency seems to have increased noticeably in the country, and long dry spells and cold waves have negatively affected the crop production. It has been suggested that at 4°C temperature and 20 percent precipitation rise, there could be a marginal yield increase in rice. In the case of wheat, the actual yield has increased in the western region with the rise in temperature while there has been a decline in other regions, as is the case for maize.

Box 7: Yak herding and climate change

The effect of climate on herding of livestock is illustrated by yaks. These are an endemic and important local economic asset of the Himalayas. Yaks are considered to be among the mountain animals that are more sensitive to climate change. Yaks are found in 15 northern districts in Nepal. It is estimated that the yak population is around 9,000 heads and the *chauri* (crossbreed between yak and cow) population is around 17,000 heads.

Yaks are raised in the elevation ranging from 3,000 to 5,000 m above mean sea level. In the peak winter when snowfalls begin, yaks are brought down to 3,000 m elevation. Yak herds start going up the mountain when temperature begins to increase. Usually their upward movement is set on a fixed date. For example, in the lower Mustang, the community begins the upward journey on 25 May and the downward journey on 25 September. This is done to have equal benefits for each herd on the natural resource distribution so as not to exhaust them.

Movement of yaks from 3,000 to 5,000 m elevation and vice versa depends on the availability of forages and suitable temperature. The optimum temperature for yak is between 0°C and 10°C. They can withstand temperatures far below the freezing point, but they are sensitive to and non-tolerant to the high temperatures. The sensitiveness is observed either by the refusal of the yaks to return to shelter or by their upward movement without the herdsman's notice. *Chauri* by comparison are better suited to withstand increased temperatures.

Source: Nepal's initial national communication to UNFCCC (2004)

Biodiversity and wildlife

A majority of the people in Nepal rely on forest products such as firewood, food, fodder, timber and medicines. The extensive utilization and increasing demand for forest and forest products has led to a decline both in area and quality. Climate change may cause forest damage through movement of forest species towards the alpine region, resulting in extinction of species and consequently a change in forest composition at lower latitudes. This could affect not only Nepal's biodiversity but also peoples' livelihoods. Tropical wet forests and warm temperate rainforests would disappear, and

¹⁸ Nepal's Initial National Communication (INC) to the Conference of the Parties (COP) of the United Nations Framework Convention on Climate Change (UNFCCC), July, 2004.

http://unfccc.int/files/parties_and_observers/parties/application/pdf/nepnc1.pdf

cool temperate vegetation would turn into warm temperate vegetation. Vegetation patterns would be different under the incremental scenario (at 2°C rise of temperature and 20% increase in rainfall) than the existing types. Thus climate change will have a direct impact on vegetation, biodiversity and even wildlife.

Health

Greater risk of kala-azar (*Visceral leishmaniasis*) and Japanese encephalitis (*Flavi-virus*) are highlighted as a climate sensitive health risk (DHM, 2004). The subtropical and warmer temperate regions are predicted to be particularly vulnerable to malaria and kala-azar. In the Terai, already people suffer from water and vector-borne diseases. It causes outbreaks of communicable disease likes dengue, malaria, kala-azar, Japanese encephalitis and diarrhoea, which are increasing year by year. Over the last 5 years a significant increase in malaria cases are reported (DHS, 2006). There were 1,341 cases of kala-azar registered in 2005/06 and 1% of those affected died (DHS, 2006).

Water resources and hydropower

Impacts on water resources and hydropower are directly related to rising temperatures that have already been observed, and are projected to increase further over the coming decades. This includes glacier retreat that in turn causes greater variability (and eventual reduction) in stream flow, and GLOFs that pose significant risks to hydropower facilities, and also to other infrastructure and human settlements.

Other climate-induced risks to water resources and hydropower facilities include flooding, landslides, and sedimentation from more intense precipitation events (particularly during the monsoon). The effect is unreliability of dry season flows that poses potentially serious risks to water and energy supplies in the lean season. For example, in Kathmandu there has been load shedding of electricity from few hours during the week up to 12 hours daily. This has consequently had adverse effects on livelihoods, economic development of the country, and climate as well by necessitating greater use of fossil fuel.

Table 5: Priority ranking of climate change impacts for Nepal

Resource	Certainty of impact	Timing of impact (urgency)	Severity of impact	Importance of resource
Water resources and hydropower	high	high	high	high
Agriculture	medium-low	medium-low	medium	high
Human health	low	medium	uncertain	High
Ecosystems/ biodiversity	low	uncertain	uncertain	Medium-high

Source: Agrawala *et al.* (2003): "Development and climate change in Nepal: Focus on water resources and Hydropower", OECD.

3. National response framework: institutions, policies and development plans

3.1 Nepal and the UNFCCC

Nepal signed the UN Framework Convention for Climate Change (UNFCCC) in June 1992. UNFCCC entered into force in Nepal in July 1994. The Kyoto Protocol entered into force in Nepal in December 2005.

The Initial National Communication (INC) to the UNFCCC was prepared in July 2004.¹⁹ The Initial National Communication included: national circumstances related to climate change; a GHG inventory; GHG emission projections and mitigation options' assessment of vulnerability and adaptation to climate change; policies and other measures; education, training and public participation; and recommended research. The INC was prepared by the Department of Hydrology and Meteorology (DHM). The preparation of the Second National Communication (SNC) has not yet been initiated.

Nepal has recently initiated the preparation of a National Adaptation Programme of Action (NAPA). A request for support from the GEF managed Least Developed Countries Fund (LDCF) for climate change adaptation was submitted in January 2007 by the GoN to UNDP. Support for preparation of the NAPA to the amount of USD 200,000 has recently been approved by UNDP/GEF in January 2008.

At the UNFCCC COP in Bali in December 2007, Nepal obtained a nomination to sit as a member of the Least Developed Country Expert Group (LEG).

3.2 National institutions related to Climate Change

The Ministry of Environment, Science and Technology (MoEST) is responsible for the overall coordination of climate change adaptation and mitigation. The Joint Secretary and Chief of the Environmental Section of MoEST is the national climate change focal point. The climate change focal point also attends the SBSTA (Subsidiary Body for Scientific and Technological Advice) of the UNFCCC.

The constitution of the Kingdom of Nepal (1990) provided for the establishment of a *Natural Resources and Environment Committee* in the House of Representatives. The main function of the committee is to evaluate policies and programme. However, the committee has been dormant for the most of the time (MFSC, 2002). In 1992 the *Environment Protection Council* (EPC) was established and chaired by the Prime Minister to serve as the highest decision making body on all matters related to the environment. The initiations of the EPC were the ratification various climate-related conventions and development of vehicle emission standards but it has also been mostly dormant.

The GoN has formed a coordination forum named the Climate Change Network (CCN). CCN is chaired by the Secretary of the MOEST and is mainly activated as an advisory forum before and after having COP meetings of UNFCCC. Two meetings have been held. Another forum named

¹⁹ http://unfccc.int/files/parties_and_observers/parties/application/pdf/nepnc1.pdf

Climate Change Network-Nepal (CCNN) has been established at the initiative of WWF-Nepal, Winrock and other stakeholders and includes a wide range of members working in the Climate Change (see Box 13, p.27).

The Government has administered the National Capacity Self Assessment (see Box 8) with the support from the UNDP.

Box 8: National Capacity Self Assessment (NCSA)

‘National Capacity Self Assessment (NCSA) for Global Environment Management Project’ is a jointly managed project by the Ministry of Environment, Science and Technology and UNDP. The main objective of the project is to identify priorities and needs for capacity building to protect the global environment considering the three ‘Rio Conventions and Associated Thematic Areas’ of bio-diversity, climate change and desertification. The NCSA is guided by ‘Project Outcome Board’ under the chairmanship of Secretary of the MoEST. The specific objectives include:

- To identify, confirm or review priority issues for action within the three thematic areas respectively;
- To explore related capacity needs within and across the three thematic areas and prioritize them;
- To catalyze targeted and coordinated action and requests for future external funding and assistance; and
- To link country action for capacity development for global environmental management to the broader national environmental management and sustainable development framework.

The country-driven approach of the NCSA enables countries to integrate their plans for capacity development in improved environmental management with broader national sustainable development goals and programmes. The project has set up three thematic working groups on Biodiversity, Climate, and Desertification.

Under the MoEST, DHM is responsible for meteorological observations, forecast, warning, climate and weather research services. DHM has four divisions (hydrology, climatology, meteorological forecasting, and coordination) and 15 sections including a climatology section for study and investigation of climate change. DHM is a focal point to IPCC, WMO, and meteorological activities of SAARC. The Department has set up weather stations (337 precipitation, 154 hydrometric, 20 sediment, 68 climatic, 22 agro-meteorological, 9 synoptic, and 6 Aero-synoptic) across Nepal. Media broadcasts the department’s weather forecast through news bulletins and daily newspapers.²⁰

The GoN in December 2005 nominated MoEST as the Designated National Authority (DNA) of the Kyoto Protocol and a Steering Committee was established in April 2006 with the Secretary of MoEST as chairperson. The DNA is not formally established with a secretariat but has a Technical Advisory Committee. The DNA receives Clean Development Mechanism (CDM) project proposals and has the responsibility of carrying out the evaluation through a technical working committee. The Chief of the Environment Section of MoEST is the chair of the technical working committee. An overview of the DNA structure in Nepal is included in Annex 8 (p.49).

Two CDM projects on biogas are registered for Nepal (see further in section 5.3, p.23). Further proposals for financing of mitigation through CDM are in preparation, e.g. micro-hydropower, water mills, fuel switching in cement and brick production. The DNA is also responsible for promoting CDM project development.

²⁰ The interim plan has emphasized the relevance of DHM: “Current meteorological information will be made public through electronic display board in all the five development regions. Danger point will be marked in main rivers. Seasonal weather forecast will be initiated. Himalayan Climate Research Centre will be established”.

3.3 Policies Related to Climate Change

MoEST with support from WWF is in the process of preparing a climate change policy for Nepal. The first local public consultation was recently held at Dhangadhi in the Far-Western Development Region, and others are planned. A first draft of the climate change policy is expected by July 2008.

A number of sector policies and strategies indirectly address climate change risks and adaptation, particularly National Wetland Policy (2003), Nepal Biodiversity Strategy (2002), Water Induced Disaster Policy (2006), Water Resource Strategy (2002), Rural Energy Policy (2006), Non-Timber Forest Products Policy (2004), Agriculture Policy (2004), Sacred Himalayan Landscape Strategy (2006), Agro-Biodiversity Policy (2007), and Bio-Safety Policy (2007).

Several Acts and Regulations have been formulated to regulate the policies and strategies, for example the Forest Act (1993) and Forest Regulation (1995), Environment Protection Act (1996) Environmental Regulation (1997), and Water Resource Act (1992). The GoN has made the Environment Impact Assessment (EIA) and Initial Environment Assessment (IEA) mandatory before carrying out any major activities. An overview of the linkages between sector policies and climate change is included in Annex 6 (p. 45).

3.4 Climate Change and Development Plans

The GoN has formulated several national-level development and sector plans (e.g. Master Plan for Forestry Sector, National Water Plan and Agriculture Perspective Plan), relevant to adaptation to climate change, although the climate change risks are not directly addressed. In the 9th and 10th Plans, climate-relevant issues were indirectly mentioned, e.g. energy switching has been emphasized with several alternative energy sources to reduce the domestic use of wood and fossil fuels and encourage greater use of hydropower and biogas.

The Interim Plan (2008 -2010) is more explicit on climate change risks and adaptation, in addition to a section on disaster management (*see* Box 9).

Box 9: The Government of Nepal Interim Plan (2008 – 2010)

The Government of Nepal, after people's movement in 2006, brought an interim constitution providing that constitution election will be held to prepare a democratic and republican constitution. The interim constitution constituted an interim government. The interim government has introduced a three year Interim Plan for 2008 to 2010. The plan has mentioned priorities, policies and strategies related to climate change in the development agenda, e.g.:

- A national policy on climate change will be formulated.
- Carbon trade will be promoted to achieve benefit from CDM under the Kyoto Protocol. In addition, carbon financing is taken as a sustainable financing source for the promotion of renewable energy technologies in Nepal
- By integrating environmental aspects in social and economic development programs through EIA system, improvements will be made in the quality of environment by means of environment-friendly development.
- Conventions on environment to which Nepal has endorsed will be publicized and implemented.

3.5 Disaster Risk Management in Nepal

As a result of a wide range of geophysical and demographic factors, Nepal is subject to various natural hazards. Nepal, among the countries in the world, stands 11th and 30th respectively with regard to vulnerability to earthquakes and floods (UNDP, 2004). Nepal is vulnerable to several hazards such as earthquakes, floods, landslides, droughts, wind storms, avalanches, debris flow, GLOF, hailstorms, fires, epidemics and lightning resulting in loss of lives and livelihoods. Between 2001 and 2005, 1,585 persons died, 832 were injured, 87,355 families affected and 38,835 houses were destroyed due to disasters in Nepal and the monetary loss was an estimated USD 36.2 million.²¹

The Ministry of Home Affairs (MoHA) is the national agency responsible for coordination of various aspects of disaster management, including preparedness, response, recovery and mitigation of disasters. The focus of disaster management in Nepal is changing from reactive (relief and response) to proactive (preparedness and mitigation) risk reduction, as can be seen in the draft national strategy for disaster management prepared by the ministry. The measures taken under disaster risk reduction (DRR) to meet with disasters in the short-term also contribute towards longer-term climate change adaptation, which is positive, if well coordinated with other stakeholders working on climate change.

A Central Disaster Relief Committee under the chairmanship of the Minister for Home Affairs and district-level disaster committees under chairmanship of the Chief District Officers in each district have been formed to coordinate and execute the activities relating to disaster preparedness, mitigation and reconstruction as well as rehabilitation as per the 'Natural Calamity Relief Act'. Regional and local-level committees may also be formed under the Act. A Central Calamity Relief Fund established under the Act is also being used to promote preparedness and mitigation, in addition to the main tasks of response and relief.

The Department of Water Induced Disaster Prevention (DWIDP) under the Ministry of Water Resources is involved in mitigating impacts of floods, debris flow and carries out river training, hazard and risk mapping, community awareness and strengthening institutions involved in managing such disasters. DWIDP works in close collaboration with MoHA on rehabilitation and reconstruction of river protection infrastructure and has its staff in most flood-prone districts in the plains. Joint Secretaries from some key line ministries have been appointed as Disaster Management focal points for MoHA, which is well aware of its coordination role to bring together relevant sectoral ministries for implementation of DRR activities. Bilateral and international organisations such as EU, UNDP, and other I/NGOs are complementing government efforts, e.g., the Community-Based Disaster Management Programme funded by the UNDP. Civil society (*see* Box 10) is also involved in these efforts.

²¹ Information provided by Ministry of Home Affairs.

Box 10: Disaster Preparedness Network (DPNet)

Disaster Preparedness Network (DPNet), initiated in 1998, is an informal network of individuals and organisations involved in the disaster management from a development perspective. The network has 35 members from 24 Government and NGOs including International and Nepal Red Cross Societies, media, donor communities, community based organizations, and municipalities.

The main reason for initiating DPNet is to enhance the capacity and improve the performance of its members/partners to share, design, implement and sustain disaster preparedness activities in Nepal. In addition, DPNet aims to promote sustainable disaster preparedness and management activities, link disaster to development, strengthen the disaster management capacity of partners and share knowledge.

MoHA has prepared a National Strategy for Disaster Risk Management (NSDRM) which has now been approved by GoN. Draft legislation is also being drafted to enable the shift from disaster response to DRR. The three-year Interim Plan has also lays emphasis on programmes like disaster management teams in coordination with the concerned ministries, for emergencies due to natural hazards or outbreak of epidemics, providing training in disaster management, reducing earthquake risks, medicine supply chain improvement among others.

4. Climate change screening of the Danida development portfolio

The point of departure for the climate change screening is the Danish development programme portfolio in Nepal. Danida currently is providing support to the GoN mainly in the Renewable Energy Sector, the Education Sector, and within Good Governance and Human Rights. An overview of the current Danida portfolio in Nepal is presented below (*see* Table 6).

The aim of climate change screening is to ensure that obvious risks (if any) to the Danida development portfolio in Nepal are addressed and in order ‘to pick the low-hanging fruits’ (if any) for additional reduction of vulnerability to climate change risks.

Table 6: An overview of the Danish development portfolio in Nepal

Programmes	Ongoing Sector Programmes		Comments	Climate Change Screening Note relevant
	Period	Budget		
Energy Sector Assistance Programme (Rural energy and environment, phase 2)	2007 – 2012	DKK 150 Million	Joint programme with Norway	Yes
Education programme			Multi-donor	No
- <i>primary education (EFA)</i>	2004- 2009	DKK 202.7 Million	-	-
- <i>secondary education (SESP)</i>	2003 - 2009	DKK 283.9 Million	-	-
Human Rights and Good Governance	2003 - 2008	DKK 94.9 Million	-	No
Peace support facility	-	DKK 50 Million	-	No
Public private partnership programme and Private Sector (B2B)	-	-	-	No
Local Grant Approbation	-	-	-	No

There is an overlap between the objectives of development programmes and the reduction of vulnerability through adaptation to climate change risks. There is thus a complementary outcome of achieving development objectives and adapting to climate change. The climate change adaptation may be intentional, but it is more likely also to be a result of the overlap with the objectives of the development programmes.

4.1 Energy Sector Assistance Programme

The ESAP provides support to the Alternative Energy Promotion Centre (AEPC) under MoEST. The assistance is provided to develop institutional strength in rural energy, a rural energy fund, and

technical support to biomass energy including improved cooking stoves (ICS), solar energy and mini-grid rural electrification through micro-hydropower.²²

AEPC is active with some support from ESAP and other donors developing opportunities for carbon finance through CDM.

The activities of ESAP are relevant for the development of clean and renewable energy in Nepal. It contributes to a low-carbon development path and includes elements of adaptation to climate change by bringing access to electricity to rural areas, and reducing emissions with or without additional carbon finance.

There are no immediate risks of climate change to the implementation of ESAP. Some concern may be directed towards the feasibility of the micro-hydropower with variations in water flows. The life span of micro-hydropower is 15 to 20 years. This will be of greater concern with the increase of the upper size of supported hydropower facilities from 100 KW to 1 MW. The options to reduce vulnerability to climate change can be addressed in project designs.

This programme has undergone climate change screening and a matrix of impacts has been prepared (*see* Annex 2, p.33).

4.2 Education Sector Advisory Team (ESAT)

The education support is multi-donor support to the GoN-owned and implemented education sector programme. Issues of climate change are not directly addressed in the programme.

An example of avoided risks and opportunities for adaptation is that the Ministry of Education and Sport (MoES) has followed up on the 2005 Hyogo Framework for Action on DRR to include DRR in curricula and in building codes of schools (Norad, 2007, p.9). WWF-Nepal collaborates with the Ministry of Education on curriculum development on environment including climate change. A school book on climate change has been produced. These examples have no direct linkage with the Danida-supported activities.

There are no immediate risks of climate change to the implementation of the programme. The options to reduce vulnerability to climate change are limited. Further screening of this programme has not been carried out.

4.3 Human Rights and Good Governance (HUGOU)

The Human Rights and Good Governance Programme can have an indirect relevance for adaptation to climate change, e.g. by improving the ability and assets to respond to climate change impacts. Issues of climate change are not directly addressed in the programme. Civil society organisations supported by HUGOU have not made specific requests regarding climate change issues, e.g. in the support to media.

Conflicts arising over access to natural resources including water and impacts from natural hazards can deter the socio-economic development and ability to adapt to future climate-related impacts.

There are no immediate risks of climate change to the implementation of the programme. The options to reduce vulnerability to climate change are limited, though awareness of climate change

²² More information on: www.aepcnepal.org.

may become a future limitation. This programme has not undergone further climate change screening.

4.4 Private Sector Assistance

There are opportunities for collaboration with the private sector, e.g. as public-private partnerships and business-to-business collaboration. Currently no activities have been identified as being of particular relevance for climate change impacts.

4.5 Other Danida Funded Programmes

Danida provides support to a forest research collaboration project (ENRECA) between the Institute of Forestry in Pokhara and University of Copenhagen. The second phase of the collaboration has just been initiated. The project is not at risk from climate change, but there could be opportunities to address the impacts of climate change and reduced emissions from avoided deforestation in the research activities.

Danida provides support to NGO projects in Nepal, e.g. through CARE Denmark, Danish Red Cross, MS (Danish NGO) and others. Collaboration with the Danish Red Cross includes elements relevant to DRR. The projects in CARE Nepal supported via CARE Denmark could be part of the ongoing effort to mainstream climate change in the project portfolio of CARE Nepal.

5. Mitigation of Climate Change and Opportunities for CDM

Mitigation of climate change includes policies and development actions that reduce the emissions of carbon dioxide (CO₂) and other GHGs. The benefits of the mitigation of GHG emissions in Nepal do not only affect Nepal alone, but rather have a global benefit. Similarly, Nepal gains a share of the benefit of mitigation of GHG emission done in other countries.

Options for GHG mitigation in Nepal include:

- Support to low-emission development paths, e.g. through energy efficiency, investments in renewable energy and technology transfer.
- Protecting and enhancing carbon sinks in forests and agriculture as a by-product of sustainable forest and land-use management.

Funding of the mitigation can be with carbon finance from the CDM under the Kyoto Protocol or from Voluntary Emission reductions (VER).

Box 11: Nepal GHG Emissions Inventory

In most developing countries the potential for mitigating emissions of CO₂ is relatively small, because the current consumption and lifestyles result in a relatively low level of emissions compared with industrialised countries.

According to the Initial National Communication the anthropogenic emission in Nepal of CO₂ plus equivalents of other GHGs from the energy sector, industries and agriculture is estimated at around 25 Million tonnes CO₂e (in 1994-95). The estimated annual net accumulation in forests and woody biomass is close to 15 Million tonnes CO₂e, and the net emission was thus around 10 Million tonnes CO₂e (in 1994-95).

The estimated population was around 20 Million in 1995, i.e. equal to a net emission of annually 0.5 Mt CO₂e / capita.²³ Other estimates set the per capita emission in Nepal to just 0.14 CO₂e / capita (CCNN, 2007).

5.1 Energy Consumption and Prospects for a Low-Carbon Development Path

Around 90% of the energy consumption in Nepal is from traditional sources, mainly from fuelwood while the commercial fuel (petroleum, coal and electricity) accounts for around 10%. Renewable energy sources account for less than 1% of the energy consumption, but hydropower is a large share of the electricity production.

Nepal imports most coal and all petroleum from India to meet the domestic fossil fuel demand. Electricity is exchanged with India. Nepal has a large hydropower potential and investments are required to develop this further. The economic potential for hydropower development in Nepal may be 43,000 MW with further potential development up to 83,000 MW. There is currently a capacity

²³ The emission of CO₂e is on average around 4 tonnes per capita globally, ca. 0,5 to 1 tonnes per capita in low income countries, and ca. 12 tonnes per capita in high income countries. The annual emission of CO₂ per capita is approximately 9 tonnes for Denmark and 20 tonnes for USA.

of 643 MW developed. The domestic consumption is 2,000 MW, so there is a substantial future export potential. The estimated potential for micro-hydropower is 100 MW of which 10 MW has been developed and further 30 MW is targeted for the next five years.²⁴

AEPC promotes renewable energy options, e.g. solar, wind and hydro in addition to biogas and improved cooking stoves. AEPC, along with I/NGOs and private companies, is promoting clean energy and energy efficient technologies. Promotion of biogas, improved cooking stoves, micro-hydro and solar energy, and improved water mills contribute to reduce GHGs.

Biogas is already developed for CDM carbon trading and other possibilities like improved traditional water mills and other sources of renewable sources of energy may be developed. A micro-hydro power CDM is in the process of validation and a project design document of improved water mills is under development.

5.2 Enhancing Carbon Sinks in Land Use and Forestry

Sustainable management of forests and land use holds a potentially large mitigation potential for Nepal, which can be combined with adaptation and improved livelihoods. Danida in the former Natural Resource Management Sector Assistance Programme (NARMSAP)²⁵ has contributed to the protection and expansion of the forest resources and soil conservation. The outcomes have improved resilience and adaptation towards impacts of climate change and climate variability.

The protection and management of forest resources is a contribution to mitigation of climate change by a reduction in the net release of GHGs. The COP 13 meeting in Bali in December 2007 brought on the agenda the protection of forests to sequester and store stocks of carbon. Avoided deforestation and forest degradation may be further explored for Nepal.

5.3 Carbon Finance through CDM

Since 2005, the MoEST has been assigned as a DNA to facilitate and regulate CDM activities (the institutional structure of CDM in Nepal is already outlined in section 3). An overview of the DNA structure for preparation of CDM projects is included in Annex 8 (p.49).

To initiate DNA activities, the MoEST has set up a steering committee headed by its Secretary in 2006. Two committees, namely Stakeholder Committee and Technical Committee, are also active in the promotion of CDM and energy efficiency pathways. Since the DNA has recently been established, few activities are being carried out to date. The DNA is responsible for:

- Receiving project proposals from project developers;
- Appointing experts/technical working groups for the evaluation of the proposals;
- Categorize the proposals according to the recommendations; and
- Forwarding the proposals to the national CDM committee.

CDM projects are being developed in the area of renewable energy (*see* Box 12).

²⁴ Information provided by Executive Director of AEPC.

²⁵ NARMSAP ended in mid 2005. A planned continuation in new phase as a component in the merged Environment Programme (environment, energy and natural resources) was not approved due to the political situation in Nepal after February 1st 2005.

Box 12: Registered and planned CDM projects in Nepal

Two CDM projects in Nepal have been registered with the CDM executive board in December 2005. These are on biogas for 19,396 plants and are part of the Biogas Support Programme (BSP-Nepal). The projects include a reduction of 93,883 tCO₂e annually. An Emission Reduction Purchase Agreement (ERPA) has been signed in March 2006 between AEPC as the project entity and the Community Development Carbon Fund (CDCF) of the World Bank with a unit price of USD 7 / CER.

A CDM project at the validation stage is on micro-hydropower. AEPC has developed the project with support from ESAP and Rural Energy Development Programme (REDP) for a total capacity of 15 MW of which ESAP will develop 8.5 MW. An ERPA has been signed by AEPC and CDCF with a unit price of USD 10.25 / CER with a total reduction of 191,000 tCO₂e. The project is yet to be registered.

Project Idea Notes (PIN) are in progress for other renewable energy projects, e.g. for solar energy and improved cooking stoves. A micro-hydropower project is listed at the validation stage in the CDM pipeline. This project is hosted by AEPC and it is expected to deliver around 33.000 tCO₂e per annum.

The national CDM committee has approved a PIN for Improved Water Mill for CDM project.

Despite having opportunities for establishing carbon trading through CDM, several limitations also exist for the development of CDM projects for securing carbon financing opportunity. Inadequate awareness among policy makers and industrials, weak institutional capacity, inadequate resources, and lack of baselines, policies and strategies are the major limitations.²⁶

5.4 Voluntary Emission Reductions

There are options for carbon financing from Voluntary Emission Reductions (VER) outside the CDM of the Kyoto Protocol. There are, however, no examples of VERs recorded so far in Nepal.

WWF Nepal plans to develop a biogas project as a VER using the WWF Gold Standard in the TAL project.²⁷

²⁶ The CDM procedures require institutions and capacity that is not always available in developing countries. ADB (2007) noted that out of 818 CDM projects proposed by developing countries in Asia just 19 CDM projects (2% of total) had been approved by October 2007.

²⁷ Terai Arc Landscape (TAL) project funded by WWF and other donors

6. Donor harmonisation and coordination of climate change activities

6.1 Climate Change Screening and Proofing

Climate screening and proofing is a donor procedure to identify possible areas of vulnerability of development programmes to climate change impacts. The screening also identifies possible interventions and the scope for donor coordination and harmonization. In Nepal, there are to date few other known instances of donors carrying out a climate change screening.²⁸

6.2 Climate Change Related Programmes and Projects in Nepal

Donors and I/NGOs in Nepal consider climate change to be an important issue for development. The aim is to further mainstream climate change in supported programmes and projects. It is acknowledged that climate change is a relevant topic for development in Nepal, but few specific actions have been taken so far. The priorities of the donors reflect the priorities of the GoN, where the emphasis is on the peace-building process and where climate change features as a less urgent and immediate priority.

A number of donor-supported programmes like ESAP are explicitly or inadvertently addressing issues relevant to adaptation to climate change risks, reduction of vulnerability and mitigating emissions. While the support to mitigation and CDM-related activities has been the main response to climate change in Nepal, there is more uncertainty as what the adaptation to climate change might entail in practical terms.

In Nepal, the GLOFs have come to symbolise the impacts of climate change. These have also attracted the main attention of the donor community. But as noted by ICIMOD, although GLOFs may be a significant issue their impacts are largely geographically limited, and there are other consequences as a result of changes in the water flows from the glaciers and changes in the monsoon precipitation due to climate change. These impacts have crucial implications on the livelihoods and socio-economic development in South Asia, where millions can be vulnerable.

Some bilateral and multilateral donors like UNEP, SNV, and GTZ have provided support to DHM and other agencies to execute specific climate change related projects (*see* Table 7). Some attention has been on support to mitigation of emissions and carbon finance through CDM. There is an emerging emphasis on adaptation and the mainstreaming of climate change impacts in the project portfolio.

DfID plans to have a small fund (GBP 500,000) to support the GoN to develop capacity for action on climate change and identify areas of further work. This is similar in scope and budget to the additional Danida funding for climate change adaptation.

²⁸ Norad (2007) has briefly addressed climate change in an assessment of mainstreaming environment in the Norwegian development portfolio in Nepal. Winrock International has carried out an assessment for the World Bank.

Table 7: Organisations with examples of climate change-related projects and activities

Organisation	Types	Name of the project	Remarks
WWF-Nepal	I/NGO	Climate Change and Energy; support to develop climate change policy	Ongoing
ICIMOD	Int. org.	Glacier and snow impact of water flow in the Hindu Kush-Himalayan region and other topics related to climate change	Ongoing
Winrock International	I/NGO	PREGA (support to develop CDM)	Completed
Practical Action Nepal	I/NGO	Reducing Vulnerability programme	On going
DHM	Gov. org.	The Enabling Activity Project (National Communication)	Completed (2001 – 2004)
		Tsho Rolpa Glacier Risk Reduction Project	Completed (1998 – 2002)
		Climate Change Impact on Glaciers and Glacier lakes in Eastern Himalayan Region	Ongoing
		Climate change impact on snow glacier cover using Remote Sensing	Completed (2006)
		Climate change scenario and impact	Completed

WWF-Nepal has been actively involved in the climate change activities for four years and supports the development of a climate change policy for Nepal. The I/NGOs like IUCN and CARE-Nepal do not have specific climate change projects, but these I/NGOs have climate change on the agenda and are planning to mainstream climate change as a ‘crosscutting issue’. CARE-Nepal is planning to assess the ‘carbon footprints’ of the operational interventions.

Practical Action has developed early warning systems for flood affected communities in Chitwan and community based approaches to disaster mitigation.

Local NGOs are indirectly addressing climate change issues concerning both mitigation and adaptation measures by carrying out awareness, research and studies. Since the climate change is an emerging topic only some local NGOs like ENPHO, CEN, and LI-BIRD have so far been engaged in raising awareness among decision makers and the population.

6.3 Donor Harmonization and Coordination

Coordination and collaboration among donors and harmonisation with the GoN policies is required to avoid duplication of support and to create an enabling platform for addressing development issues such as climate change (*see* Box 13).

The formal donor coordination group on the environment is currently not functional. There is no evidence revealed that climate change risks and adaptation have been addressed as a topic in any other donor coordination forum, e.g. in natural resource management or infrastructure. There might have been some interaction on CDM and mitigation in donor coordination groups.

There is, however, an *ad hoc* coordination in more informal forums. A first meeting of an informal donor coordination group with the GoN participation to address climate change was called for 13 March 2008. There was a second meeting on 13 May 2008, which was attended by the climate change focal point of the EoD.

Box 13: Climate change networking and coordination (CCNN and CCN)

The Climate Change Network-Nepal (CCNN) was established by WWF and Winrock International Nepal and others in August 2003. There is no GoN participation in CCNN. The network was supported by EU. The aim was to support and lobby for the ratification of the Kyoto Protocol by Nepal. After Nepal ratified the Kyoto Protocol the CCNN has continued as an informal network. There are currently nine members: UNDP, WWF Nepal, Winrock International Nepal, IUCN, the National Trust for Nature Conservation, ICIMOD, Clean Energy Nepal (CEN), Practical Action Nepal and JICA.

The Climate Change Network (CCN) was formed by MoEST after UNFCCC COP 12 in 2006. It is a network of organisations working in climate change issues that mainly convenes before and after COP meetings. The network is being chaired by the Secretary of the MoEST and has 29 representatives from NGOs, private sector, donors and government,

6.2 Cooperation among South Asian Countries

When climate change impacts like floods and soil erosion occurs in Nepal the further consequences may be felt in India and Bangladesh. Considering the necessity of coordination and collaboration among South Asia Association for Regional Cooperation (SAARC) countries on disaster management, a Disaster Management Centre (SDMC) was set up in October 2006 at the premises of National Institute of Disaster Management in New Delhi.

The Centre has the mandate to serve SAARC members (Afghanistan, Bangladesh, Bhutan, India, Maldives, Nepal, Pakistan and Sri Lanka). The Centre conducts studies and research, organises workshops and training programmes, publishes reports and documents, and provides various policy advisory services to the Member Countries.²⁹

Recently, SDMC has also set up a climate change centre. This will bring further cooperation among the SAARC countries in coping with climate change issues in a collective way. For an example, in February 2008, Bangladesh hosted a SAARC minister level meeting on climate change.³⁰

ICIMOD has worked for the last 25 years in reducing physical, economic and social vulnerabilities in our largely mountainous member country of Nepal. ICIMOD as an intergovernmental organization and the key collaborator of the UNFCCC related nodal ministry (MoEST) of the GoN as well as UNEP Regional Office in Bangkok, Thailand. ICIMOD is a member of the CCNN and other related committees or groups. ICIMOD follows a programmatic approach for regional collaboration on key development issues including climate change.

²⁹ Source: SAARC website

³⁰ Source: global-warming-news.newslib.com/story/6990-25325/

7. Findings and Recommendations

The findings and recommendations are those of the climate change screening team. These are for further discussion with the EOD and the Danida development partners in Nepal.

7.1 Findings on climate risks and vulnerability in Nepal

- Nepal is already affected by climate variability and extreme weather events resulting in hazards such as floods and landslides. With future climate change and risks of increase in magnitude and frequency of extreme weather events, the vulnerable Nepali population is likely to be faced with greater climate risks. The ability to address climate-related extreme events today is an indication of the ability to address such events in the future.
- The main climate-related risks and thus priorities for action in Nepal are: (i) the GLOFs with potential impacts for hundreds to thousands of people; (ii) impacts on livelihoods and economy from extreme weather events due to changes in Monsoon and Western Disturbance weather systems with impacts for millions of people; (iii) consequences for economic sector like hydropower and agriculture; and (iv) derived longer-term consequences on health (food security, and water and vector-borne diseases).
- Climate change risks are noted by the GoN and the donors but currently have a relatively low priority due to the on-going peace and democratisation process and overall post-conflict situation. Disaster management has got some priority, but further attention to climate change risks could be brought into the development process together with disaster risk reduction.
- The vulnerability to climate change is a result of both climate related and socio-economic events. In 30 years, when more severe climate change is expected the current population of Nepal of about 26 million may have doubled at the current population growth rate of 2.5 % *p.a.* (or double within 40 years with a 1.7 % *p.a.* population growth rate). With pressure on natural resources and available land, the exposure and vulnerability to climate change risks may increase.
- Preventive measures for adaptation to climate change and disaster risk reduction require inter-sector and inter-agency coordination and collaboration, which is only partly in place. The identification of urgent adaptation needs should be addressed in the forthcoming National Adaptation Programme of Action (NAPA).
- A key gap in policy formulation is the articulation of the consequences of climate change and climate variability to livelihoods and economic development. A first step to overcome this deficiency is to narrow the uncertainty by improving the quality and timing of climate-related information ranging from short-term forecasting of extreme weather events to developing longer-term climate change scenarios.
- Climate risk information generation and application to climate-sensitive sectors have not yet been institutionalised in Nepal. The cross-sectoral influence of climate change requires a higher degree of inter-sectoral coordination and collaboration.

7.2 Findings about development cooperation and climate change

- The Danida development cooperation with Nepal is not at direct risk from climate change. The only area of possible concern may be the climate risks on the investments in renewable energy, e.g. structural impacts from floods, and the availability of water for micro-hydropower and biomass for energy.
- The Energy Sector Assistance Programme (ESAP) is already implicitly addressing climate change by supporting renewable energy alternatives for a low-carbon development path.
- Donors and I/NGOs are concerned about climate change but few activities have been initiated on climate change adaptation. There is a broad interest in mainstreaming climate change risks and vulnerability in development programmes and projects. The level of donor coordination on climate change has been low but is growing. It will be relevant to bring climate change issues into several sectors.
- There has been relatively good progress on developing carbon finance through the Clean Development Mechanism (CDM) from mitigation projects, but the overall potential may be limited for Nepal.

7.3 Recommendations for follow-up by Embassy of Denmark

1. **Mainstreaming climate change:** When appropriate, the EOD should seek to include climate change risks and adaptation in annual consultations, annual programme reviews and when identifying and designing future sector programme support, e.g. in programme concept notes. EOD can make use of entry points for addressing climate change outlined in the Danish Climate and Development Action Programme. (No additional costs).
2. **Climate change and disaster risk reduction focal point:** Further formalise and continue to provide adequate support for a Climate Change and Disaster Risk Reduction focal point at the EOD. Include the functions of the focal point in the job description. Attend regional Danida course on climate change and development expected to be arranged by the MFA Competence Centre (UMKC). (No additional costs).
3. **Donor harmonisation:** When appropriate the EOD should include climate change risk, adaptation to climate change in the development process and promotion of a low-carbon development path at the various groups for donor coordination. (No additional costs).
4. **Documentation of relevance of ESAP to address climate change:** Some effort could be made to document the existing efforts to promote renewable energy supply and improved livelihoods. Although not by design, ESAP is an exemplary case of a Danida programme that is already addressing issues related to climate change (Limited additional costs from ESAP).
5. **Co-financing of NAPA preparation:** It is recommended that the EOD should be open for a request from MoEST and UNDP for a co-financing of the preparation of the NAPA. The co-financing can be managed by UNDP and shall ensure that NAPA preparation has resources for consultations, is integrated with development plans and related sector plans and disaster management, and can be completed in a shorter time frame. The emphasis is on initiating small pilot activities in order to fast-track implementation of adaptation activities. GEF has provided USD 200,000 for the NAPA preparation and it is suggested that Danida provides an equal amount. (Funding of up to DKK 1,000,000 from additional Danida climate change funding).

6. **Co-financing of improved climate data collection and management at DHM:** It is recommended that the EOD could be open for a request from DHM (MoEST) for co-financing of assistance for improved climate data processing capabilities to enable generation of user-friendly climate risk information for decision making purposes to reduce the uncertainty of climate change risks and vulnerability. (Funding of up to *DKK 2,000,000* from additional Danida climate change funding).
7. **Co-financing of baseline assessment of CDM or VER projects in renewable energy:** Alternative Energy Promotion Centre (AEPC) made a request for technical assistance to develop baseline scenarios³¹ for CDM projects in renewable energy mainly concerning micro-hydropower and other renewable energy, e.g. for programmatic CDM. This support will help reduce a key obstacle to development of CDM projects and thus potentially unleash future CDM carbon finance to replace ODA for investments. It is recommended that the EOD could be open to a request from AEPC (MoEST). The technical assistance should preferably not be stand-alone but part of a co-financing of support to facilitate CDM carbon finance. (Funding from ESAP budget or from up to *DKK 1,000,000* from additional Danida climate change funding)
8. **Preparation for COP 15 and post-2012:** Support the MoEST to coordinate the development of the GoN position on the successor to the post-Kyoto framework at the 15th Conference of the Parties (COP) to the UNFCCC to be held in Copenhagen in 2009. This may include organising pre- and post- COP meetings with the climate change forum or similar in Bhutan from COP 14 onwards, coordinating positions with other LDC countries, developing a position on a reform of CDM rules for LDCs including the role and eligibility of forest conservation and supporting COP 15 attendance by additional relevant Government and non-government representatives (up to *DKK 1,000,000*).
9. **Climate footprint of Danida activities in Nepal:** the EOD could consider the ‘*climate footprints*’ of the Danida operations in Nepal ranging from energy efficiency assessment of the Embassy, use of generators for electricity back-up in projects and residential areas, options for use of renewable energy in projects and residents, means of transportation, consumption of petrol, and fuel efficiency of purchased vehicles. The EOD can have interaction with Winrock and CARE-Nepal regarding the assessment of the “Climate footprints” and the Danida Representation in Phnom Penh, Cambodia.

The current Danish cooperation with Nepal is underpinned by an Interim Country Strategy. A revised Country Strategy for the Danish development cooperation with Nepal including sector emphasis will be further decided after the end of the Constitution Assembly period has been completed by 2009 or later. At this stage it will be feasible to address climate change adaptation in future programmes.

There will be further attention on the reduced emissions from deforestation and degradation (REDD) in Nepal. This may be a further opportunity should Danida enter into future activities in natural resource management in Nepal.

The Process Action Plan (*see* Annex 1, p. 32) includes a suggested plan for follow-up by the EOD.

³¹ For Nepal to benefit from CDM, studies of possible baselines (and approval of these by the Executive Board in Bonn) are needed to support private sector applications for Certified Emission Reductions. The challenge is that Nepal use hydropower extensively and only inclusions of possible import from neighboring China and India can create an attractive baseline for CDM. As lack of funds for investments are evident the scenario is not that unlikely. Before India and China starts producing electricity from coal to export to Nepal, financing for exploitation of the hydro power potential in Nepal should be made available, and CDM could be one of the measures.

Table 8: Danish development and climate action plan and the Danida portfolio in Nepal

The strategic priorities of the Danish Climate and Development Action Programme (2005)	Current Danida development cooperation with Nepal	Potential Climate Change Proofing of Danida development cooperation with Nepal
<ul style="list-style-type: none"> ▪ Raising the <u>policy profile</u> of climate change in bilateral development cooperation. 	<ul style="list-style-type: none"> ▪ None identified 	<ul style="list-style-type: none"> ▪ Potential support to development of NAPA for Nepal. ▪ Follow-up on the climate change screening in donor coordination groups.
<ul style="list-style-type: none"> ▪ Integrating <u>adaptation</u> to climate change in development cooperation programmes 	<ul style="list-style-type: none"> ▪ None identified which directly address adaptation. 	<ul style="list-style-type: none"> ▪ Potential support to development of NAPA for Nepal. ▪ Support to the process of mainstreaming climate change in national development programmes.
<ul style="list-style-type: none"> ▪ Integrating climate change <u>mitigation</u> in the context of development cooperation 	<ul style="list-style-type: none"> ▪ Elements to support mitigation in ESAP, e.g. support to renewable energy which contribute to a low carbon development path. 	<ul style="list-style-type: none"> ▪ Continued assistance through ESAP to promote renewable energy. ▪ Option to support the development of baselines for renewable energy for CDM. ▪ Option to address mitigation in natural resource management, e.g. sustainable forest management.
<ul style="list-style-type: none"> ▪ Developing <u>capacity</u> to address climate change and take appropriate actions in development cooperation programmes and national programmes 	<ul style="list-style-type: none"> ▪ None directly identified but some issues are addressed indirectly through the promotion of renewable energy in ESAP. 	<ul style="list-style-type: none"> ▪ Support to DHM for improved data collection and forecasting including down scaling of climate models for applications both in the short and long run.

Annex 1: Process Action Plan for Climate Change Proofing

The Process Action Plan (PAP) includes tasks from the recommendations to be initiated by the Embassy of Denmark (EOD), Kathmandu. The timing is indicative and should be confirmed by the EOD. Further details of the recommendations are included in section 7.

Action	Completed by	Comments and documentation
1. Mainstreaming climate change ⁰⁾	To be ongoing; Concept notes for programme committees	Recorded in ToR for Program Reviews, Annual Consultation Minutes, concept notes for new programme phases.
2. Climate change and disaster risk reduction focal point ⁰⁾	To be ongoing	Task included in job description; record of CCA and DRR related activities. Attending planned Danida (UMKC) regional course for Asia on climate change in Fall of 2008.
3. Donor harmonisation ⁰⁾	To be ongoing	Minutes from relevant donor coordination group meetings.
4. Documentation of relevance of ESAP to address climate change ^{*)}	August 2008	Documentation produces on climate change relevant activities and results of ESAP (AEPC)
5. Co-financing of NAPA preparation ^{#)}	September 2008	Request forwarded by MoEST. Agreement signed. (Option for one combined agreement of up to DKK 5.0 Million with MoEST for recommendation 5, 6, 7 and 8 covering the additional Danida climate funding).
6. Co-financing of improved climate data collection and management at DHM ^{#)}		
7. Co-financing of baseline assessment of CDM or VER projects in renewable energy ^{#)}		
8. Support to COP15 preparation and post 2012 ^{#)}		
9. The Danish 'carbon foot prints' in Nepal	To be ongoing	Could be included in the tasks of the climate change focal point.

^{*)} Funding from ongoing sector programmes

^{#)} Funding from additional Danida climate change funding

⁰⁾ No additional costs.

Annex 2: Sector Climate Change Screening Matrix (ESAP)

The climate change screening matrix is the initial step in mainstreaming of climate change into development programmes. The purpose is to provide an overview of potential risks to Danida's development programme and identify opportunities for additional adaptation to climate change for a specific sector programme. The rapid appraisal carried out for the screening matrix is not an assessment of the climate change risks in the sector *per se* but rather aims to ensure that development efforts, i.e. the sector programme support or projects, are 'proofed' against losses due to climate change, climate variability and extreme weather events.

The attached rapid appraisal matrix to inform the climate change screening matrix is a draft version for possible further development by Danida. The initial version of the matrix was developed and applied to five Danida supported sector programmes in Kenya in October 2007.

The first column in the table includes all the programme components and sub-components/outputs. It would also be relevant to include programme budgets divided into sub-components, when possible. The second and third columns are the risk assessment. In the second column the risks of climate change impacts on the development cooperation are assessed. The risks are here confined to the sensitivity of the development sector programme to climate change and will include elements of climate change risks and sector sensitivity. The risk assessment is whether there will be a loss of development effectiveness due to climate change, i.e. whether the objectives are not achieved as effectively as expected. The ranking into 'low', 'medium' and 'high' are defined as follows:

- 'low' (less than 1 % (almost none) of the development investment could be at risk)
- 'medium' (up to 10 % of the development investment could be at risk)
- 'high' (more than 10 % of the development investment could be at risk)

The climate change risk assessment is used for the identification of components where an improved risk assessment and reduction could be required. Comments are included in the third column. Because the sector programme support has activities now and results within 5 to 10 years, but climate change impacts are expected after several decades, it is likely that the risk will be low in general. Irreversible investments with a long time span of several decades could be affected. Sector programmes already addressing climate variability may be less prone to future climate change risks.

The fourth and fifth columns address opportunities for additional adaptation for reducing vulnerability to climate change. In the fourth column the ranking is:

- 'low' (less than 1 % of the development programme (budget and activity) is relevant for additional adaptation measures to reduce climate change vulnerability).
- 'medium' (up to 10 % of the development programme (budget and activity) can be relevant for additional adaptation measures to reduce climate change vulnerability).
- 'high' (more than 10 % of the development programme (budget and activity) could be relevant for additional adaptation measures to reduce climate change vulnerability).

The climate change opportunity assessment is used to identify actions where development effectiveness could be improved by addressing additional adaptation options and other measures to mainstream the potential risks of climate change in the sector.

Energy Sector Assistance Programme (ESAP) ³²

Components and Outputs	Climate Risks	Comments: Risk Assessment	Options for Adaptation	Comments: Option for Adaptation
1. Support to Institutional Strengthening of Rural Energy Sector Component				
1.1: Coherent rural energy policy addressing both on-and-off-grid electrification issues, among others	Low	The implementation of the output is not at direct risk from climate change	Low to medium	Include climate risk management in the policy and strategy.
1.2: An institutional basis with clearly defined roles established with focus on decentralization and the private sector	Low	The implementation of the output is not at direct risk from climate change	Low to medium	Develop awareness on climate change risk and adaptation measures.
1.3: SWAp for rural energy development in place	Low	The implementation of the output is not at direct risk from climate change	Low	Possibility of having synergy on climate change issues and adaptation measures.
1.4: An accountable and effective institutional leadership, especially in AEPC and key partner institutions with transparent decision-making process for rural energy policy, planning and management	Low	The implementation of the output is not at direct risk from climate change	Low to medium	Sensitize AEPC and key partner institutions on climate change risks including adaptation to climate change and disaster risk reduction.
1.5: Conducive working environment in AEPC and partner organizations, including human resource development policy, planning & management	Low	The implementation of the output is not at direct risk from climate change	Medium	Include climate change risk assessment, adaptation measures, and disaster risk reduction tools in guidelines and training manuals.
1.6: Integrated documentation of the sector development and of major changes in the programme (ESAP II) in place	Low	The implementation of the output is not at direct risk from climate change	Medium	Incorporate climate change risk assessment, adaptation measures, and disaster risk reduction in the documentation. Improve cross-sector coordination.
1.7: Coherency among rural grid and off-grid electrification	Low	The implementation of the output is not direct at risk from climate	Medium	Sensitize the cooperatives on climate change risks, adaptation

³² Information on components and outputs is from the ESAP document (July, 2006). The screening of climate change risks and options for reduced vulnerability is a draft for comments. The draft was made available to ESAP on March 10, 2008.

Components and Outputs	Climate Risks	Comments: Risk Assessment	Options for Adaptation	Comments: Option for Adaptation
		change. Supply can be disrupted from extreme weather events.		measures and disaster risk reduction.
2. Support to Rural Energy Investment: Rural Energy Fund Component				
2.1: Funds raised for support to rural energy investments from national and external development partners	Low	The implementation of the output is not at direct risk from climate change	Low	Not relevant for vulnerability reduction.
2.2: Financial sector credits available for rural energy investment	Medium	The investment could be at risk from climate change including both structural impacts, sources of input (biomass and hydro) and distribution. Subject to a feasibility assessment including EIA and IEE.	Medium	Option to integrate adaptation measures and disaster preparedness in an appraisal of possible project financing.
2.3: Funds managed in a transparent and efficient manner	Low	The implementation of the output is not directly at risk from climate change but the investments are.	Low to medium	Option to develop screening of climate change risks and vulnerability reduction as part of the investment appraisal.
2.4: Funds optimally channelled by REF for the investment in different rural energy solutions	Medium	The implementation of the output could be at risk from climate change. Subject to feasibility assessment including EIA and IEA.	Medium	Include climate change adaptation in investment appraisals.
3. Technical supports Component				
3.1 Biomass energy				
3.1.1: Capacity of district-based local partner organization to implement and monitor biomass energy solution interventions increased	Low	The implementation of the output is not at direct risk from climate change	Medium	Include the climate change risk assessment tools, climate change adaptation measures, and disaster risk reduction in the TOT.
3.1.2: ICS dissemination scaled up and integrated in other rural development programmes.	Low	The implementation of the output is not at direct risk from climate change.	Low to medium	Include the climate change risk assessment tools, climate change adaptation measures, and disaster risk reduction in information materials.
3.1.3: All development organizations have adapted uniform approach in dissemination of biomass technologies.	Low	The implementation of the output is not at direct risk from climate change	Low to medium	Consider inclusion of climate change screening or similar and adaptation (contribution to sustainable development) in the

Components and Outputs	Climate Risks	Comments: Risk Assessment	Options for Adaptation	Comments: Option for Adaptation
				uniform approach.
3.1.4: Other biomass energy solutions identified, tested in local conditions and applied.	Medium	Implementation of the output can be at risk subject to change in local climate conditions including extreme weather events.	Low to medium	Carry out climate change risk assessment and include the climate change adaptation and disaster risk reduction preparedness measures in the feasibility assessment.
3.1.5: Policy in [a] place for identified biomass energy solutions, i.e. especially gassifiers, briquetting and cogeneration.	Medium	Implementation of the output can be at risk subject to change in local climate.	Medium	Option to include climate change risk assessment and inclusion of climate change adaptation measures.
3.1.6: Awareness among rural people on efficient biomass energy solutions created	Low	The implementation of the output is not at direct risk from climate change	Medium	Entry point for awareness on climate change risks, adaptation and disaster preparedness measures.
3.1.7: Biomass energy technologies are commercialized with involvement of private sector	Medium	Implementation of the output can be at risk from climate change influencing availability of biomass and in return of investments.	Medium	Option to sensitize the private sector on climate change risks and adaptation measures.
3.1.8: Biomass stoves installed in the next 5 years in all ecological zones.	Low	The implementation of the output is not at direct risk from climate change	Medium	Effectiveness of the implementation of the output could include adaptation to climate change impacts.
3.2 Solar Energy				
3.2.1: Efficient and effective service providers	Low	The implementation of the output is not at direct risk from climate change.	Low to medium	Option to include climate change risk assessment and inclusion of climate change adaptation measures.
3.2.2: Improved quality assurance systems	Low	The implementation of the output is not at direct risk from climate change	Low to medium	Option to include climate change screening and adaptation as criteria for investment selection.
3.2.3: Inputs to policy formulation	Low	The implementation of the output is not at direct risk from climate change	Medium	Include adaptation measures and disaster preparedness in the policy measures.
3.2.4: Credit delivery modalities	Low	The implementation of the output is	Medium	Option to include climate change

Components and Outputs	Climate Risks	Comments: Risk Assessment	Options for Adaptation	Comments: Option for Adaptation
developed for easy access and wider availability		not at direct risk from climate change		screening and adaptation as criteria for investment selection.
3.2.5: Increased use of solar home systems and solar tuki	Medium	Implementation can be at risk subject to change in local climate and structural impacts from extreme weather events.	Medium	Promote use of renewable energy as climate change adaptation measure.
3.2.6: [Implementation modalities for larger solar PV systems and solar thermal systems identified & tested].	Medium	Implementation can be at risk subject to change in local climate and structural impacts from extreme weather events.	Medium	Promote use of renewable energy as adaptation measure. Include climate change risks and sensitivity as an investment appraisal criterion.
3.2.7: Increased cooperation for complementarities and synergies	Low	The implementation of the output is not at direct risk from climate change	Medium	Option to include climate change risk assessment and inclusion of climate change adaptation measures.
3.3 Mini-grid rural electrification				
3.3.1: Inputs to rural energy policy formulation	Low	The implementation of the output is not at direct risk from climate change.	Medium	Include provision on adaptation measures and disaster preparedness in the Policy.
3.3.2: Rural electrification activities are integrated into local planning activities	Low	The implementation of the output is not at direct risk from climate change.	Medium	Option to include cross-sector climate change adaptation measures and disaster risk reduction.
3.3.3: Efficient service delivery strategy	Low	The implementation of the output is not at direct risk from climate change.	Low	Not relevant to reduce vulnerability.
3.3.4: Efficient and competitive service providers	Low	The implementation of the output is not at direct risk from climate change.	Medium	Option to sensitize on climate change risks and adaptation measures.
3.3.5: Institutionalized local ownership and use of electricity in rural areas not covered by national grid	Low	The implementation of the output is not at direct risk from climate change.	Low to medium	Local ownership will provide incentives for adaptation including early warning to protect the electricity supply.
3.3.6: Schemes identified, appraised and forwarded to REF for subsidy	Medium	The implementation of the output could be at risk from climate	Medium	Include the provision of climate change adaptation measures and

Components and Outputs	Climate Risks	Comments: Risk Assessment	Options for Adaptation	Comments: Option for Adaptation
		change and climate variability. Feasibility assessment including future water availability and risks of floods.		disaster risk reduction to reduce vulnerability in the schemes.
3.3.7: Increased information about rural mini-grid schemes and electricity end-use possibilities	Low	The implementation of the output is not at direct risk from climate change.	Medium	Include climate change adaptation measures and disaster risk reduction as part of the awareness raising.

Annex 3: The Danish Climate and Development Action Programme (2005)

The Ministry of Foreign Affairs of Denmark (MFA) launched the “*Danish Climate and Development Action Programme – a tool kit for climate proofing Danish Development Cooperation*” in August 2005. A merger with the *Danish Disaster Risk Reduction (DDR) Action Programme* (Draft, September 2007) is planned.

The Climate and Development Action Programme includes the following main elements with specific actions on:

- Raising the policy profile of climate change in multilateral and bilateral development cooperation.
- Integrating adaptation to climate change in development cooperation programmes
- Integrating climate change mitigation in the context of development cooperation
- Developing capacity to address climate change and take appropriate actions in development cooperation programmes and national programmes

Each of these elements is addressed within the following ‘entry-points’: i) Multilateral development cooperation, ii) Bilateral development cooperation: country programme level, iii) Bilateral development cooperation: sector programme support level, and iv) the Mixed Credit Scheme (soft loans).

As part of the implementation of the Danish Climate and Development Action Programme, Climate Change reports have been prepared eight Danida programme countries (Viet Nam, Tanzania, Mozambique, Bangladesh, Bolivia, Nicaragua, Kenya and Uganda) in 2006 and 2007. Climate change screening is planned for 2008 in another nine programme countries including Nepal, Bhutan and Cambodia. The emphasis of the climate change screening has shifted from initially the national capacity to address climate change towards a more specific climate change screening of the Danish development cooperation portfolio.

The Danish Climate and Development Action Programme was prepared as part of the national implementation of the “*EU Action Plan on Climate Change in the Context of Development Cooperation*” (November, 2004). The first bi-annual progress report on the implementation of the EU Action Plan (2007) concluded: “*Denmark’s Climate and Development Action Programme has set the stage to become an exemplary showcase of the integration of climate change into development cooperation, using a comprehensive, yet ultimately practical and flexible approach. In the first years of its implementation, Denmark’s initial experience will need to be closely followed by other Members States and the Commission, as they may provide valuable experience to be shared within the EU and with its partner countries.*”³³

The Danida Aid Management Guidelines (AMG) on programme management makes reference to the Climate and Development Action Programme. ‘Climate’ is included in the Danida priority themes (which also include topics like HIV/Aids, youth and private sector) and these must be considered when relevant in the programme concept note, design or appraisal stage. Risks to the programme from climate change are included as one the screening topics in the mandatory Danida Environmental Screening Note of development cooperation programmes and projects. For this purpose the Danish Climate and Development Action Programme includes a tool box for climate change screening.

³³ Source: First bi-annual Progress Report on the Implementation by the EU of the Action Plan to accompany the EU Strategy on Climate Change in the Context of Development Cooperation (2007)

Annex 4: The overlapping agendas of disaster risk reduction (DRR) and Climate Change Adaptation (CCA)

The overlapping agendas of disaster risk reduction (DRR) and climate change adaptation (CCA) is currently receiving much attention from different sectors, including NGOs and practitioners, UN and donor agencies, and academics. Dialogue between the DRR and CCA communities focuses on creating stronger linkages, putting greater effort on learning more from each other, and collaborating conceptually and practically. In part, this common interest has come from a simultaneous recognition that risk reduction requires a far more holistic approach than has been previously been applied. Neither DRR nor CCA is about disasters or climate change only, but rather about all of the social, physical and economic factors that influence the magnitude of and are affected by the threat. The table below elaborates on some of the linkages.

Examples	Probability	Impact	DRR	CCA
Large scale humanitarian disasters caused by refugees from war, epidemics and natural events like tsunamis, and earthquakes. These may have been triggered or exacerbated by impacts of climate change on natural resources, e.g. conflicts over access to water resources and access. Disaster management options include mainly response and relief. DRR focus on reducing the vulnerability, e.g. early warning systems and contingency plans for disaster preparedness	Low	High	●	
Disasters caused by extreme weather events (e.g. droughts, storms, floods, and large landslides). These events are part of natural climate variability, but their frequency and magnitude could be exacerbated by climate change. Disaster management options include preparedness and response to disasters, e.g. through early warning systems. The DRR and CCA aim at reducing the impacts extreme weather events by addressing the vulnerability through development planning, e.g. to reduce the risks of flooding and landslides or through appropriate water resources management and drought-resistant agricultural practices for drought. Disaster prone areas are targeted by DRR.	Low to Medium	Medium to High	●	●
The incremental impacts of climate change and climate variability on agriculture, health and infrastructure that are gradual may not be identified as disasters, but may be part of CCA. The response is to increased uncertainty related to climate variability as well as to opportunities to reduce vulnerability in development planning, e.g. though changes in cropping patterns in agriculture. The accumulated risks may increase vulnerability to hazards and thereby increase disaster impacts.	High	Low	○	●

- : Addressed in policies and institutions related to DRR / CCA
- : Not directly addressed in DRR mandate but with indirect influence on the agenda

Annex 5: Linking climate change risk, vulnerability and adaptation

DRIVERS	PRESSURE (increased or reduced)	STATE	RESPONSE
Climate Change Hazards	Climate Change Risk Exposure	Vulnerability to Climate Change	Adaptation
Increase in mean temperature in particular during winter and towards higher altitudes			
<ul style="list-style-type: none"> ▪ Melting of mountain glaciers 	<ul style="list-style-type: none"> ▪ Loss of water reserve and potential of an all year supply flow. ▪ Risk of Glacier Lake Outburst Floods (GLOF) 	<ul style="list-style-type: none"> ▪ Reduced water flow to downstream agriculture and hydro-power ▪ Downstream risks increases due to the potential of a GLOF 	<ul style="list-style-type: none"> ▪ Water resource management including storage. ▪ Few response options for prevention of glacier melting ▪ Establish flood warning system
<ul style="list-style-type: none"> ▪ Reduced frost in highlands 	<ul style="list-style-type: none"> ▪ Change Length of Growth Period (LGP) ▪ Fewer days with cold spells 	<ul style="list-style-type: none"> ▪ Potential benefits for crop production and human health 	<ul style="list-style-type: none"> ▪ Expanded potential growing area. Opportunities for other commercial crops
<ul style="list-style-type: none"> ▪ Increased in temperature and evaporation 	<ul style="list-style-type: none"> ▪ Changes in range and season for yak herding 	<ul style="list-style-type: none"> ▪ Change in browsing opportunities ▪ Low milk production from yak 	<ul style="list-style-type: none"> ▪ The yak moves towards a cooler range (yak response) ▪ Changes in livestock from yak to cross-breeds and smaller livestock with changes in browsing opportunities (yak farmer response)
Increase in mean temperature in particular during summer in Terai			
<ul style="list-style-type: none"> ▪ Increased evaporation 	<ul style="list-style-type: none"> ▪ Reduced length of growth period (LGP) ▪ Reduced water availability and water stress on crops and ecosystems. ▪ Transformation of ecosystems towards more water resistant 	<ul style="list-style-type: none"> ▪ Expansion of arid and semi-arid lands borders. 	<ul style="list-style-type: none"> ▪ Efficient water use and conservation

DRIVERS	PRESSURE (increased or reduced)	STATE	RESPONSE
Climate Change Hazards	Climate Change Risk Exposure	Vulnerability to Climate Change	Adaptation
	species.		
<ul style="list-style-type: none"> Seasonal droughts 	<ul style="list-style-type: none"> Loss of agricultural production Forest fires 	<ul style="list-style-type: none"> Impacts on income and livelihoods Loss of biodiversity and forest ecosystem 	<ul style="list-style-type: none"> Community based management practices and early warning. Water harvesting and storage; irrigation capacity Promotion of genetically adaptive species Improved forecasting of droughts
<ul style="list-style-type: none"> Occurrence of disease vectors due to expanded range (combination of increased temperature and changes in precipitation) 	<ul style="list-style-type: none"> Expanded range of vectors for Malaria, and others like Japanese Encephalitis 	<ul style="list-style-type: none"> Population in areas not previously under influence of malaria. 	<ul style="list-style-type: none"> Malaria prevention (nets and profylaksis) Control of vectors Awareness to people with little prior experience with malaria Sanitation
<ul style="list-style-type: none"> Occurrences of agricultural pests (combination of increased temperature and changes in precipitation) 	<ul style="list-style-type: none"> Loss of agricultural production in particular in marginal areas 	<ul style="list-style-type: none"> Farmers with inadequate access to extension and response. 	<ul style="list-style-type: none"> Early warning systems linked with integrated pest management. Changes in crops and varieties
Reduction in precipitation in particular during the monsoon in Eastern Nepal			
<ul style="list-style-type: none"> Drought (prolonged periods, seasonal and localised) 	<ul style="list-style-type: none"> Reduction or loss of agricultural and horticulture crop production in particular in the Terai 	<ul style="list-style-type: none"> Reduced food security Loss of potential export markets 	<ul style="list-style-type: none"> Drought forecasting Changes in farming systems to more drought tolerant crops. Efficiency in water use (best economic use of a scarce resource); efficient drip irrigation assuming access to water resources Water harvesting and conservation in small dams and

DRIVERS	PRESSURE (increased or reduced)	STATE	RESPONSE
Climate Change Hazards	Climate Change Risk Exposure	Vulnerability to Climate Change	Adaptation
			<ul style="list-style-type: none"> larger reservoirs.
	<ul style="list-style-type: none"> Consequences for supply of hydro-power 	<ul style="list-style-type: none"> Hydro-power suppliers 	<ul style="list-style-type: none"> Micro-hydro power plans must be climate proofed to ensure that water supply will be adequate.
	<ul style="list-style-type: none"> Shifting border of semi-arid and arid lands. Changing browsing potential 	<ul style="list-style-type: none"> Pastoralists and their livestock 	<ul style="list-style-type: none"> Rural-rural migration of live stock herders (traditional adaptation)
	<ul style="list-style-type: none"> Changing livelihood potentials Increased pressure on scarce resources, e.g. charcoal production. 	<ul style="list-style-type: none"> Farmers with limited knowledge and access to adaptation measures Decrease in forest areas 	<ul style="list-style-type: none"> Access to sustainable alternative income and credit/saving mechanisms. Management rules and tools for scarce natural resources
	<ul style="list-style-type: none"> Health impacts 	<ul style="list-style-type: none"> Reduced access to clean water results in health risks. 	<ul style="list-style-type: none"> Awareness on water diseases and prevention Access to primary health services
	<ul style="list-style-type: none"> Changes in wildlife migration and impacts on ecosystems, e.g. loss of wetlands 	<ul style="list-style-type: none"> Vulnerable ecosystems National parks and tourism facilities 	<ul style="list-style-type: none"> Land management, e.g. protection and restoration of upstream forests.
	<ul style="list-style-type: none"> Water scarcity in cities (reduced access to safe water) 	<ul style="list-style-type: none"> Reduces access to water for public utility services 	<ul style="list-style-type: none"> Improved water efficiency in urban water supply, e.g. reducing system leaks.
	<ul style="list-style-type: none"> Drying of wetlands 	<ul style="list-style-type: none"> Loss of biodiversity and ecosystem assets and services. 	<ul style="list-style-type: none"> conservation of up-stream forests and watersheds
Increase in precipitation (average precipitation will decrease but extreme events may be more frequent):			
<ul style="list-style-type: none"> Flooding mainly in Terai 	<ul style="list-style-type: none"> Damage to agricultural crops and soil erosion. Uncertainty of livelihoods and 	<ul style="list-style-type: none"> Farmers with inadequate soil protection against flash floods Siltation of water ways, e.g. 	<ul style="list-style-type: none"> Early warning systems Adaptation of farming systems to risk of top soil erosion, e.g.

DRIVERS	PRESSURE (increased or reduced)	STATE	RESPONSE
Climate Change Hazards	Climate Change Risk Exposure	Vulnerability to Climate Change	Adaptation
	accumulated risks.	reduced navigation and filling up hydropower dams.	contour farming and gully management. <ul style="list-style-type: none"> Reforestation to protect top soils and retain surface water.
	<ul style="list-style-type: none"> Reduced accessibility due to damage on infra-structure or inaccessibility 	<ul style="list-style-type: none"> Entire economy is vulnerable. People on flood prone lands 	<ul style="list-style-type: none"> Physical planning, e.g. based on expected rather than historical climate data. Revised building codes taking into account expected future weather events.
	<ul style="list-style-type: none"> Water borne diseases from polluted sources, e.g. flooding of wells and dams used for drinking water 	<ul style="list-style-type: none"> Vulnerable people with low access to safe water and preventive health care 	<ul style="list-style-type: none"> Protection of safe water sources Awareness on water resource management and sanitation
	<ul style="list-style-type: none"> Flooding in cities dues to undersized infra-structure 	<ul style="list-style-type: none"> Poor neighbourhoods with lack of infra-structure Lower-lying residential areas and roads 	<ul style="list-style-type: none"> Standards and maintenance of urban infrastructure, e.g. storm drains. Urban planning and regulation
Increased climate variability			
<ul style="list-style-type: none"> Climate variations intensity in frequency and magnitudes (rainfall fluctuation and seasonal variations) 	<ul style="list-style-type: none"> Extreme weather events Uncertainty in weather conditions and water availability 	<ul style="list-style-type: none"> Farmers and rural dwellers with little prior experience in large climate variation and extreme weather events Accumulated consequences of higher frequencies of extreme weather events. 	<ul style="list-style-type: none"> Risk reductions from: early warning systems (up to 3-6 months), income diversification, access to credit, savings and insurance schemes

Annex 6: Policy and Regulation relevant for Climate Change

Policy Document	Type	Key Points	Remarks (relations to climate change)
Interim Plan (2008 – 2010)	National plan	The main objective of this Plan is to establish peace and reduce the existing unemployment, poverty and inequality in the country.	Interim plan has given priority for Climate Change issues (e.g. provision for formulation of Climate Change policy).
Sustainable Development Agenda of Nepal, 2003	National agenda	Mainly focus on livelihoods improvement and renewable energy	It has indirectly addressed climate change impacts
Nepal Environmental Policy and Action Plan, 1993	National policy	It has addresses environmental issues.	No direct reference to climate change
Environment Protection Act, 1996; Environment Protection Regulation, 1997	National legislation	It has made mandatory to carry out EIA and IEE.	No direct reference to climate change
Nepal Water Plan (2005)	National plan	Mainly focus on management of water resources.	It has made provision of establishing “Himalayan Climate Change and Research Centre”.
Water Resource Strategy, Nepal 2002	National Strategy	Underscores the need for effective implementation of EIA and strategic environment assessment (SEA) norms and recommendations.	Mentions about the Himalayan Climate Change and Research Centre (p.110)
Water Induced Disaster Management Policy, 2003	National policy	It has emphasized conservation of water resources and the control of flood and soil erosion;	No direct reference to climate change
Soil and Watershed Conservation Act, 1982	National Act	To combat degradation of valuable land form flooding, water-logging, salinity in irrigated areas and acceleration of siltation in storage reservoirs, and to properly manage the catchments of Nepal.	No direct reference to climate change
Master Plan for Forestry Sector (1989)	National plan	It has categorized the whole forestry sector into five major compo nets (e.g. Community Forestry Programme)	No direct reference to climate change

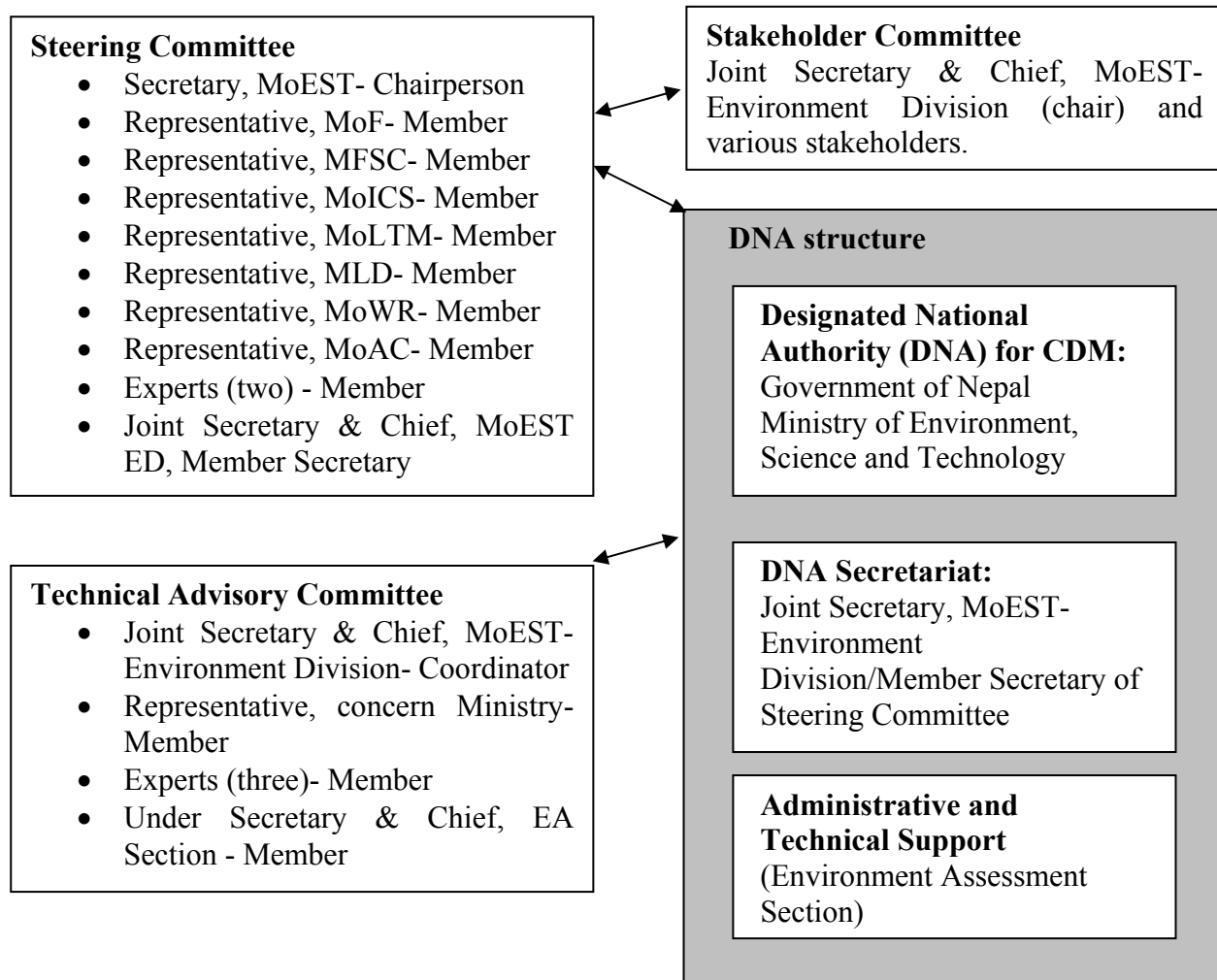
Policy Document	Type	Key Points	Remarks (relations to climate change)
Revised Forestry Sector Policy 2000	National policy	It has emphasized the management of Terai forests (e.g. Collaborative Forest Management)	No direct reference to climate change
Forest Act, 1993 and Regulation, 1995	National legislation	It has emphasized community based management practices of forest.	No direct reference to climate change
The Nepal Biodiversity Conservation Strategy 2002	National strategy	It emphasizes conducting EIAs in accordance with the provisions of the Environment Protection Act 1996 and Environment Protection Regulations 1997 to assess impacts of development activities on biodiversity.	No direct reference to climate change
The Industry Policy 1992	National policy	It has emphasized measures to minimize adverse impacts on the environment during the establishment, expansion, and diversification of industries.	No direct reference to climate change
Rural Energy Policy 2006	National policy	It has promoted renewable energy, energy efficiency technologies.	No direct reference to climate change
National Solid Waste Management Policy 1996	National policy	It has emphasized the importance of carrying out an EIA prior to selecting the final waste disposal site to reduce environment pollution.	No direct reference to climate change
Transport Policy, 2001	National policy	It has made restriction to use air and noise pollution making vehicles.	No direct reference to climate change

Annex 7: Institutions relevant for Climate Change in Nepal

Institution	Type	Relevant objective	Remarks
Parliamentary Committee on Environment	Advisory body	To review of bills on environment management and recommend to the Parliament for approval To monitor and evaluate the performances of line ministries and guidance for performance improvement	Committee of parliamentarians headed by a parliamentarian.
National Planning Commission (NPC)	Gov. body	To prepare plans and policies for development.	Commission is headed by Rt. Hon'ble Prime Minister with ministers, secretaries, and representatives of private sector, academia, and experts.
Environment Protection Council (EPC)	Gov. Council	To provide advice to government on setting policies and strategies to achieve the objective of sustainable development. To coordinate at the highest level in government, private sector, academia, and others to facilitate in the implementation.	Council is headed by Rt. Hon'ble Prime Minister with ministers, secretaries, and representatives of private sector, academia, and with members from experts working in the field as members
Ministry of Environment, Science and Technology (MoEST)	Government Institution	Formulation, implementation, monitoring and evaluation of policy, plans, and programs on environment, science and technology	Focal Point for Climate Change and secretariat for the Designated National Authority (DNA) for CDM.
Ministry of Home Affairs (MoHA)	Government Institution	To manage natural disaster.	Apex body for natural disaster.
Alternative Energy Promotion Centre (AEPC)	Government Institution (Autonomous)	To provide the suggestion to GoN for the formulation of alternative and renewable energy technology policies for their promotion, extension, development and dissemination	It is managed by a Board which is headed by Minister of MoEST.
Department of Hydrology and Meteorology (DHM)	Government Institution	Collect and disseminate hydrological and meteorological information for water resources, agriculture, energy, and	DHM is focal point to IPCC, WMO, and meteorological activities of SAARC. DHM prepared initial national communication to UNFCCC in

Institution	Type	Relevant objective	Remarks
		other development activities.	2004.
Designated National Authority (DNA)	CDM management committee	To facilitate and regulate the Clean Development Mechanism under the Kyoto protocol.	Three sub-committees have been formed to deal with CDM project.
Climate Change Network (CCN)	Network (Gov. and Non-Gov.)	To coordinate with stakeholders (government, NGO, private sector etc.) before and after COP meetings	Chaired by the Secretary of MoEST; 29 member organisations.
Climate Change Network Nepal (CCNN)	Network (Non-Gov)	To coordinate and create awareness on the climate change issue at local and national; and to enable Nepal to cope with present and future impacts and vulnerabilities to climate change.	An informal network of nine organizations that are engaged in climate change issues in Nepal.
Disaster Preparedness Network (DPNet)	Network (Non-Gov)	To enhance the capacity and improve the performance of its members/partners to share, design, implement and sustain disaster preparedness activities in Nepal	DPNet aims to promote and spread sustainable disaster preparedness and management activities with a view to link disaster to development throughout Nepal

Annex 8: CDM Institutional Structure in Nepal



Annex 9: List of References

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Annex 10: List of Persons Met

Name	Position and Organisation
Ministry of Environment, Science and Technology (MoEST)	
1. Narayan Prasad Silwal	: Secretary, MoEST
2. Meena Khanal	: Joint Secretary, Climate Change focal point, MoEST
3. Batu Krishna Uprety	: Chief, Environment Assessment Section. Member Least Development Countries Experts Group (LEG).
4. Chiranjibi Gautam	: National Project Manager, National Capacity Needs Self Assessment for Global Environment Management Project, MoEST/UNDP/GEF
Ministry of Home Affairs (MoHA)	
5. Pratap Kumar Pathak	: Joint Secretary, Ministry of Home Affairs
6. Iswar Regmi	: Disaster Management Section, Ministry of Home Affairs
7. Shambhu Pd. Marasini	: Section Officer, Ministry of Home Affairs
National Planning Commission	
8. Rama Kanta Gauro	: Member of National Planning Commission, GoN
9. Swoyambhu Man Amatya	: Member Secretary, National Planning Commission
Department of Hydrology and Meteorology (DHM) of MoEST	
10. Nirmal Hari Rajbhandari	: Director General, Department of Hydrology and Meteorology
11. Keshav P. Sharma	: Deputy Director General, Department of Hydrology and Meteorology
12. Jagadishwor Karmacharya	: Senior Divisonal Meteorologist, DHM
13. Saraju K. Baidya	: Senior Divisonal Meteorologist, DHM
14. Archana Shrestha	: Meteorologist, Department of Hydrology and Meteorology
15. Bijay Kumar Pokharel	: Hydrologist engineer, DHM
16. Dilip K. Gautam	: Hydrologist Engineer, Department of Hydrology and Meteorology
17. Madan L. Shrestha	: Nepal Academy of Science and Technology (Retired Director General, DHM)
Alternative Energy Promotion Centre (AEPC)	
18. Govinda Raj Pokharel	: Executive director, AEPC
Department of Water Induced Disaster Prevention (DWIDP)	
19. Narayan Prasad Bhattarai	: Director General, Department of Water Induced Disaster Prevention (DWIDP)

Name	: Position and Organisation
Embassy of Denmark	
20. Finn Thilsted	: Ambassador, Embassy of Denmark
21. Peter Eilschow Olesen	: Deputy, Embassy of Denmark
22. Shiva Sharma Paudyal	: Senior Programme Officer, Embassy of Denmark
ESAP	
23. Niels Juhl Thomsen	: Chief Adviser, Danida, Energy Sector Assistance Programme (ESAP)
24. Devendra P. Adhikari	: Component manager, mini grid electrification component, Energy Sector Assistance Programme (ESAP)
ESAT	
25. Gitte Stilling	: Chief Technical Advisor, Education sector advisory team (ESAT)
HUGOU	
26. Lars Peter Christensen	: Programme Coordinator, Danida Human Rights and Good Governance (HUGOU)
Embassy of Norway	
27. Anne Ødegaard	: First secretary, Norwegian Embassy
DfID	
28. Clare Shakya	: Sr. Regional Environment and Water Adviser, DFID
UNDP	
29. Vijaya Singh	: Assistant Resident Representative, Environment, Energy and Disaster Reduction Unit, UNDP
ADB	
30. Nagendra Sapkota	: Social Environment Officer, Nepal Resident Mission, ADB
ICIMOD	
31. Andreas Schield	: Director General, ICIMOD
32. Arun B. Shrestha	: Climate change specialist, ICIMOD
33. Bikash Sharma	: Energy Specialist, ICIMOD
WWF Nepal	
34. Anil Manandhar	: Country Representative, WWF Nepal
35. Sandeep Chamling Rai	: Programme manager, Climate and Energy, WWF Nepal
36. Santosh Nepal	: Director conservation policy, WWF Nepal
IUCN Nepal	
37. Ram Chandra Khanal	: Senior Programme Officer, Programme Coordination Unit, IUCN
38. Emma Sundman	: Climate Change Officer, IUCN

Name	:	Position and Organisation
CARE Nepal		
39. Maksha Ram Maharjan	:	Programme Coordinator, CARE Nepal
Winrock		
40. Bharat Poudel	:	Winrock International, Nepal
41. Karuna Sharma	:	Winrock International, Nepal
42. Prem Sagra Subedi	:	Winrock International, Nepal
43. Suman Basnet	:	Winrock International, Nepal
44. Megesh Tiwari	:	Winrock International, Nepal
ENPHO		
45. Bhusan Tuladhar	:	Executive director, Environment and Public Health Organisation (ENPHO)