NEPAL: PILOT PROGRAM FOR CLIMATE RESILIENCE (PPCR)
WORLD BANK / ADB / IFC JOINT MISSION
15-21 NOVEMBER 2010
Aide Memoire
10 December 2010

I. INTRODUCTION

1. A joint Asian Development Bank (ADB), International Finance Corporation (IFC), and World Bank[1] team fielded a mission to Nepal from November 15 - 21, 2010 for the Pilot Program for Climate Resilience (PPCR). Mission members from ADB included Cindy Malvicini (Senior Water Resources Management Specialist, co - Team Leader) and Anil Pokhrel (Climate Change Adviser); from the IFC, Anupa Aryal Pant (Operations Analyst, co-Team Leader), Noleen Dube (Operations Officer); and from the World Bank, Claudia Sadoff (Lead Economist, co-Team leader), Sylvia Lee (Water Resources Specialist), and Stephanie Borsboom (Operations Officer).

2. The main objective of the mission was to agree on the concept papers for the major components of the Strategic Program for Climate Resilience (SPCR). The detailed tasks were to: consult with relevant stakeholders, finalize the project concept notes to be included in the SPCR, and to begin discussions on possible implementation arrangements for the SPCR. The Ministry of Environment (MoE) was the nodal agency for the mission and led mission arrangements, including meetings with relevant government officials and stakeholders, including development partners, civil society organizations (CSOs), and private sector representatives. A list of persons met is in Annex 1 and the list of meetings held is in Annex 2. This Aide Memoire summarizes the mission's findings and agreements made with the Government and will be subject to the approval of higher authorities within the Government and the MDBs. A wrap-up meeting, chaired by Ministry of Finance (MoF) Secretary Rameshwor Khanal, was held on 21 November, and the aide memoire was revised to reflect comments received during wrap-up. The Government agreed to confirm the aide memoire by 28 November 2010.

II. BACKGROUND

3. The Government of Nepal accepted the offer to participate in the PPCR on 13 May 2009. In March 2010 Nepal received a $225,000 grant to provide technical assistance (TA) to prepare its SPCR. ADB, IFC, and the World Bank fielded the first Joint Programming Mission from 3 to 9 September 2009. During this first joint programming mission initial consultations were held with thematic working groups created under the National Adaptation Program of Action (NAPA) TA and other stakeholders on the possible scope of the SPCR. Joint MDB follow-up consultations with the Government and other stakeholders were held on 23-26 November 2009, 1-4 February 2010, 5-14 July 2010, and 5-7 October 2010.

4. The SPCR TA team of consultants was competitively recruited and consists of one international consultant (climate adaptation specialist/team leader) and three national consultants, (i) a project design facilitator/deputy team leader, (ii) a natural resources management specialist, and (iii) an infrastructure/water/energy specialist. The national team was fielded in May 2010 and the international team leader was fielded in June 2010. They are tasked to prepare the SPCR preparatory document according to the Government's expectations taking into consideration the requirements of, and guidelines issued by the SPCR Sub-

[1] Hereafter collectively called the multilateral development banks (MDBs).

Committee. In addition, a private sector consultant was recruited in September 2010 to work alongside the SPCR team with a focus on private sector engagement.

5. An SPCR TA inception workshop was held on 6 July 2010, and SPCR Steering Committee meetings were held on 16 July and 7 October 2010. A Policy Advisory Committee chaired by the National Planning Commission (NPC) was formed and its first meeting was held on 21 September 2010. Additionally, the Federation of Nepalese Chambers of Commerce and Industry (FNCCI) formed a Private Sector Working Group upon advice of MoE to explore possibilities for the engagement of the IFC in SPCR activities in Nepal.

6. After conducting a literature review, extensive consultations with the NAPA/PPCR thematic working groups and selected communities, a risk assessment, and an adaptive capacity assessment (on sectoral, district and community levels), the consulting team made specific proposals for the broad areas of SPCR interventions during consultations that were held from October 5-7, 2010. These were agreed to by MoE and the MDBs. The consulting team then prepared 4 project/component concept notes to serve as basis for this (November 15 – 21, 2010) joint mission.

III. SUMMARY OF MISSION CONSULTATIONS

7. During the joint mission a wide range of stakeholders was consulted on the draft concept notes. Separate consultations were held for each component and additional consultations were held with civil society and development partners.

8. **Kick-off Meeting**. The kick-off consisted of remarks by the Honorable Member, NPC, heads of agencies from ADB, World Bank, and IFC, and Secretary, MoE. Other agencies in attendance included MoF, Ministry of Agriculture and Cooperatives (MoAC), Ministry of Forests and Soil Conservation (MoFSC), Ministry of Health and Population (MoHP), Ministry of Irrigation (MoI), Ministry of Energy (MoEn), Ministry of Local Development (MoLD), Department of Agriculture (DoA), Department of Water Supply and Sewerage (DWSS), National Association of VDCs in Nepal (NAVIN), Municipality Association of Nepal, and FNCCI. The SPCR TA team leader made a presentation on the PPCR objectives and provided an overview of the direction of the proposed SPCR. Speakers highlighted the fact that the global community is eager to learn lessons from Nepal's SPCR. They pointed out that Nepal is recently reported as the fourth most vulnerable country to climate change and highlighted the need to address the issues of national interest in the SPCR document. The approach should be innovative, transformational, action-oriented and not "business as usual."

9. **Consultation on Component I: Building Climate Resilience of Watersheds and Water Resources in Mountain Eco-Regions**. During discussions on Component 1, it was stated that Nepal's SPCR interventions should be based on an ecosystem approach considering the watershed as a unit for project implementation. Discussions also covered issues such as connectivity, biodiversity and ecosystems to make vulnerable mountain communities climate resilient. Key agencies represented included MoAC, MoEn, Department of Forests (DoF), Department of Soil Conservation and Watershed Management (DSCWM), DoA, DHM, DWSS, and NAVIN.

10. **Consultation on Component II: Building Resilience to Climate-Related Extreme Events**. The need for an early warning system at national and local levels and the requirement for real time data collection were discussed during the review of Component 2. The Siwalik region and the ephemeral rivers, originating from the Siwaliks/mid-hills, have inadequate

weather/flow gauges and new weather stations should be installed. Areas prone to debris flows and flash floods were also considered important. The role of micro-finance, micro-credit and micro-insurance to make an early warning system sustainable was also highlighted. A self-financing approach with some livelihood opportunities is necessary to achieve the stated development objective. To adequately make a national-level weather forecast, an atmospheric weather condition monitoring system was recommended. It was also pointed out that the Department of Hydrology and Meteorology (DHM) could collect additional revenues for providing quality data to different user groups. There were also opinions that the village-level early warning systems already established should be made more reliable. Capacity development of DHM including automatic weather stations and forecast models was discussed in detail and the need for funds to install additional stations, operate and maintain any equipment and weather stations was identified. Agencies represented in this meeting included Department of Irrigation (DoI), DHM, Nepal Engineering College, Disaster Preparedness Network, and Practical Action.

11. **Consultation on Component III: Mainstreaming Climate Risk Management in Development**. Component 3 is related to mainstreaming climate change in development policies and planning. The need for integration of climate change risk management at ministry and sectoral levels was discussed and stakeholders noted that ministries and departments do not have the required capacity to conduct risk screening and implement climate proofed projects. Participants provided suggestions which need to be further integrated in the concept note before it is included in the SPCR proposal. The possibility of involvement of the private sector in the proposed data base management center was also discussed. Key agencies represented included MoAC, Disaster Preparedness Network, Practical Action, Pokhara University, and Kathmandu University.

12. **Consultation on Component IV: Building Climate Resilient Communities through Private Sector Participation**. Participants from the private sector expressed their interest to be involved in climate resilient interventions proposed in Component 4. Entrepreneurs from the seed, micro-finance, insurance, low cost housing and infrastructure sectors discussed the need for concessional loans for their climate resilience activities as this was an area that would benefit from low interest and long term loans. The business community was of the opinion that while the private sector was committed to utilizing the soft loans, there was also need for using grant funding for capacity building and awareness raising activities. Some members of the private sector opined that while they were concerned about the effects of climate change in their businesses, they could only address it effectively if it was feasible and cost effective. Therefore the PPCR funds could be used to enable projects that would not have happened due to various market barriers. Government representatives stressed that the role of government in research and development in agriculture and as a source of information in early warning systems should be recognized. It was critical that the government and private sector collaborate in the implementation of Component 4 and clear role delineation should be made in this public-private partnership. The government's role was also to create an enabling environment for the private sector to deliver its services. Participants also highlighted that the role of the private sector was not limited to Component 4 only, but was crosscutting all 4 components of the proposed SPCR. In addition, it was recognized that the public sector could not build resilience on its own and needed multiple actors including the private sector. Key agencies represented included MoEn, Nepal Agriculture Research Council (NARC), DoA, International Development Enterprises, FNCCI, SQCC, SEAN. and private sector organizations in the seeds, hydropower, bamboo-housing/materials, micro-finance, banking and insurance sectors.

13. **Consultation with CSOs**. Agencies represented included NGO Federation of Nepal, National Trust for Nature Conservation, Practical Action, Forest Action, International Union for Conservation of Nature (IUCN), National Disaster Management Forum-Nepal, and International Development Enterprises. Participants appreciated the focus in Component 1 on water-related issues but some noted that issues on livelihoods and biodiversity were inadequately addressed. Due to its diverse ecological zones, Nepal is rich in biodiversity which supports people's livelihoods and continued supply of ecosystems services. The need to have an integrated approach linking the water-forest-agriculture nexus was noted, as well as the need to address the issues from the Churia and Terai area in addition to the mountains. Some participants also suggested collecting some lessons from existing payment for ecosystems services (PES) mechanisms and integrating them into the document. Regarding the Component 2 output on micro-credit and micro-insurance, some participants recognized its value but also cautioned that some inherent challenges exist that might hinder sustainability of insurance schemes.

14. Participants also expressed their interest to collaborate with SPCR activities as they have comparative advantages such as planning, implementation, technology transfer, knowledge sharing and capacity building. The possibility of accessing PPCR funds by the civil society through a basket fund for climate change was proposed, but it was explained that the PPCR will not be setting up new financial mechanisms or institutions. The Government is considering establishing a trust fund on climate change that might be accessed by the relevant stakeholders including civil society.

15. **Consultation with Development Partners**. Agencies represented included UK Department for International Development (DFID), United Nations Development Programme (UNDP), Canadian Cooperation Office (CCO), German Technical Cooperation (GTZ), and Netherlands Development Organization (SNV). Discussion on each proposed component highlighted that there are opportunities for synergies with development partners. These have been summarized at the end of each concept paper. UNDP identified potential linkages on disaster management and its ecosystem-based adaptation program. DFID proposed collaboration on capacity building at the local, regional and national levels along with project implementation in connection with the agriculture-forestry-water nexus. In relation to Component 1, development partners reiterated the importance of ecosystem and biodiversity to ensure the protection of water resources at the source. The need for linkages with related Government programs such as the Local Government Capacity Development Program was also highlighted. There was also a discussion on the creation of a fund flow mechanism and institutional set up to support the implementation and achievement of the goals of PPCR and other climate change projects. It was the opinion of several development partners that a Climate Change Coordination Unit within the Climate Change Management Division of MoE should be created to coordinate all climate change related projects implemented by government, donors, MDBs and other agencies. In addition, a project management unit (PMU) with adequate human resources, with support from the respective projects, could be set up for each climate change-related project. This structure would support a more sustainable approach to climate change activities in Nepal and provide effective management of Nepal's various external funding resources.

IV. KEY MISSION FINDINGS AND ACTIONS AGREED

A. Financial Envelope

16. The Government of Nepal advised the mission of its plans to submit an SPCR proposal in the amount of $110 million, requesting $50 million in grants and $60 million in concessional

loans, but the Government will provide final guidance during the next joint mission. Private sector participation would be channeled both directly through the IFC and through public-private partnership. Indicative allocations for the four components total $108 million, which does not include necessary funds for project preparation, MDB administration fees, and overall SPCR program management.

17. In the course of mission discussions, the development partners and civil society representatives raised the possibility of establishing a multi-donor trust fund for climate change activities in Nepal through which PPCR funds could be channeled. The mission concluded, however, that there was not enough time in the PPCR preparation process and that creating such a fund was not within the mandate of the PPCR. The MDBs agreed to continue discussion with partners on the possibility of creating such a trust fund, but this will not affect the fund flow for the implementation of the PPCR activities.

B. Draft SPCR Proposal

1. Part 1 – Background and Rationale

18. MoE has completed the background sections (Part I) of the draft SPCR proposal (see Annex 3 for the main text and www.moenv.gov.np and www.ppcrnepal.gov.np for full text with appendices). The mission tentatively agreed on the draft. It will be incorporated into the draft SPCR proposal following the next joint mission in February 2011.

2. Overview and Components

19. Four interrelated components are proposed:

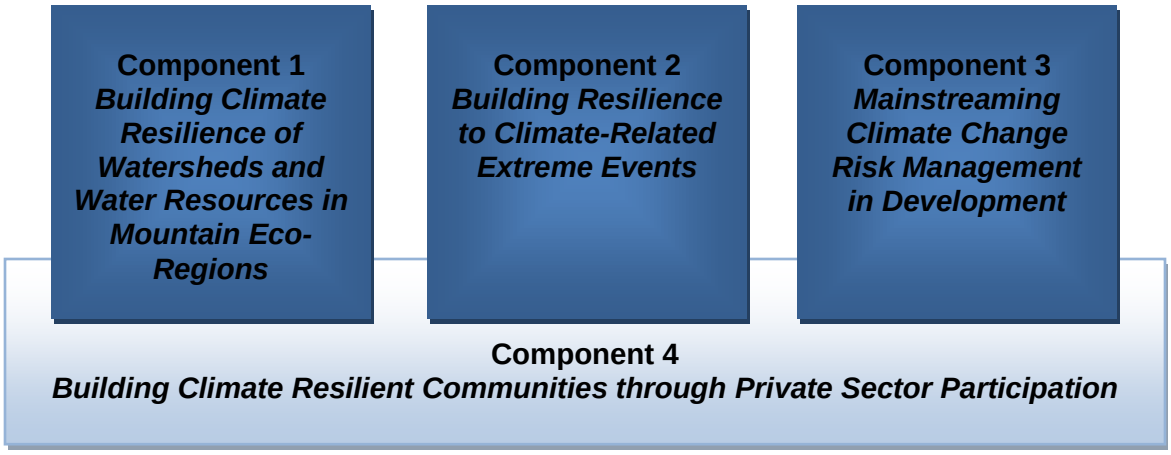
1, Building Climate Resilience of Watersheds and Water Resources in Mountain Eco-Regions
2. Building Resilience to Climate-Related Extreme Events
3. Mainstreaming Climate Change Risk Management in Development
4. Building Climate Resilient Communities through Private Sector Participation

20. The selection of these four components was based on the Risk Assessment and Adaptive Capacity Assessment undertaken with the NAPA/SPCR Thematic Working Groups, and through district and community consultations. They address the following climate change risks: Increase in temperature, extreme high precipitation; extreme low precipitation/drought; increased climate variability.

PPCR Component	Corresponding NAPA Activities
Component 1: *Building Climate Resilience of Watersheds and Water Resources in Mountain Eco-Regions*	• Integrated Watershed Management in Churia to ensure ecosystem and community adaptation to climate change • On-farm soil and water conservation initiatives to support hill and mountain communities vulnerable to climate change • Promotion and up-scaling of Multi Use System (MUS) for the benefit of poor and vulnerable communities in mid-hills and Churia range of Nepal • Up scaling and implementation of non-conventional irrigation systems in water stressed areas • Construction of water retaining structures as sustainable

PPCR Component	Corresponding NAPA Activities
	adaptation measures to address the effect of climate change • Integrated wetland management • Promotion of rain water harvesting structures and technologies • Water supply source conservation (quality as well as quantity) and strengthening programs of existing projects affected by source reduction
Component 2: *Building Resilience to Climate-Related Extreme Events*	• Flood management to reduce the vulnerability of communities and increase their adaptive capacity • Community-based disaster risk reduction with climate change dimension • GLOF monitoring and disaster risk reduction • Early warning system development in disaster prone areas • Interlink climate change with DRR and enhancement of institutional capacity at different levels • Management of existing hydrological and meteorological network at DHM and up-scaling the services • Strengthening forecasting / early warning and surveillance system on climate change & health in Nepal
Component 3: *Mainstreaming Climate Change Risk Management in Development*	• Building capacity to enhance community adaptation to climatic hazards
Component 4: *Building Climate Resilient Communities through Private Sector Participation*	• Enabling climate vulnerable communities sustain livelihoods by improving access to agricultural services • Increasing community climate adaptive capacity through improved production and marketing systems

21. The design of the components is complementary and reinforcing. While Components 1-3 are primarily focused on the public sector, the private sector can also have an important role in providing relevant technologies, goods and services. Component 4 therefore aims to build climate resilient communities through private sector participation, and at the same time strengthen the delivery of Components 1 - 3.



22. Focused consultations on the individual components confirmed that they address priority needs identified both by the NAPA and the SPCR consultation processes, and that the broad activities described in the Concept Notes are rational, feasible and not duplicative of ongoing activities – in fact in many cases potential synergies were identified. They are described below and Concept Notes are attached in Annexes 4-7.

Component 1 - *Building Climate Resilience of Watersheds and Water Resources in Mountain Eco-Regions*

23. This component will enable communities in Nepal's vulnerable ecosystems to have improved access to and reliability of watershed and water resources. Activities will focus on implementing existing watershed management plans (WMP), preparing and implementing new WMPs for water resources protection, addressing ways to improve the reliability and availability of the water supply, promoting livelihood improvement activities, and biodiversity conservation. The Ministry of Forests and Soil Conservations will be the lead agency for this component. An indicative budget of US $45 million was agreed.

Component 2 - *Building Resilience to Climate-Related Extreme Events*

24. This component is designed to build resilience in vulnerable communities by establishing early warning systems and improving access to financial instruments such as micro-insurance/finance that reduce the adverse impacts of climate induced shocks. Activities will focus on the installation of real-time hydro-meteorological infrastructure, and information nation-wide, the establishment of early warning systems for priority vulnerable communities, and the creation of climate risk insurance / finance programs for vulnerable communities, home owners and women. The Ministry of Agriculture and Cooperatives and Ministry of Environment/DHM will be the co-lead agencies for this component. An indicative budget of US $40 million was agreed.

Component 3 - *Mainstreaming Climate Change Risk Management in Development*

25. This component will facilitate the integration of climate change risk management into development planning by preparing climate risk management guidelines and procedures, and implementing a comprehensive program of capacity building for climate change risk management at the national, sectoral, district and local levels, targeting both the public sector and civil society. The Ministry of Environment will be the lead agency. An indicative budget of

US $10 million was agreed. The mission noted the need to look at results achieved and lessons learned under the current MoE capacity strengthening initiatives, and to build on and not overlap with the several capacity building initiatives underway or planned. Issues to be addressed in further developing the draft TA proposal are in Annex 6b.

27. It is envisaged that project preparation grants would be required for detailed design and in-depth financial, economic, social, and environmental analysis of public sector investment Components 1 and 2, but would not be needed for the Component 3 TA. The preparatory actions, mentioned in paragraph 31, will be completed prior to the next joint mission, and the MDBs will work with the Government to revise the proposal for inclusion in the SPCR program proposal. The Component 3 TA will be finalized and approved by the respective MDBs as soon as possible after SPCR approval by the PPCR sub-committee.

Component 4 - *Building Climate Resilient Communities through Private Sector Participation*

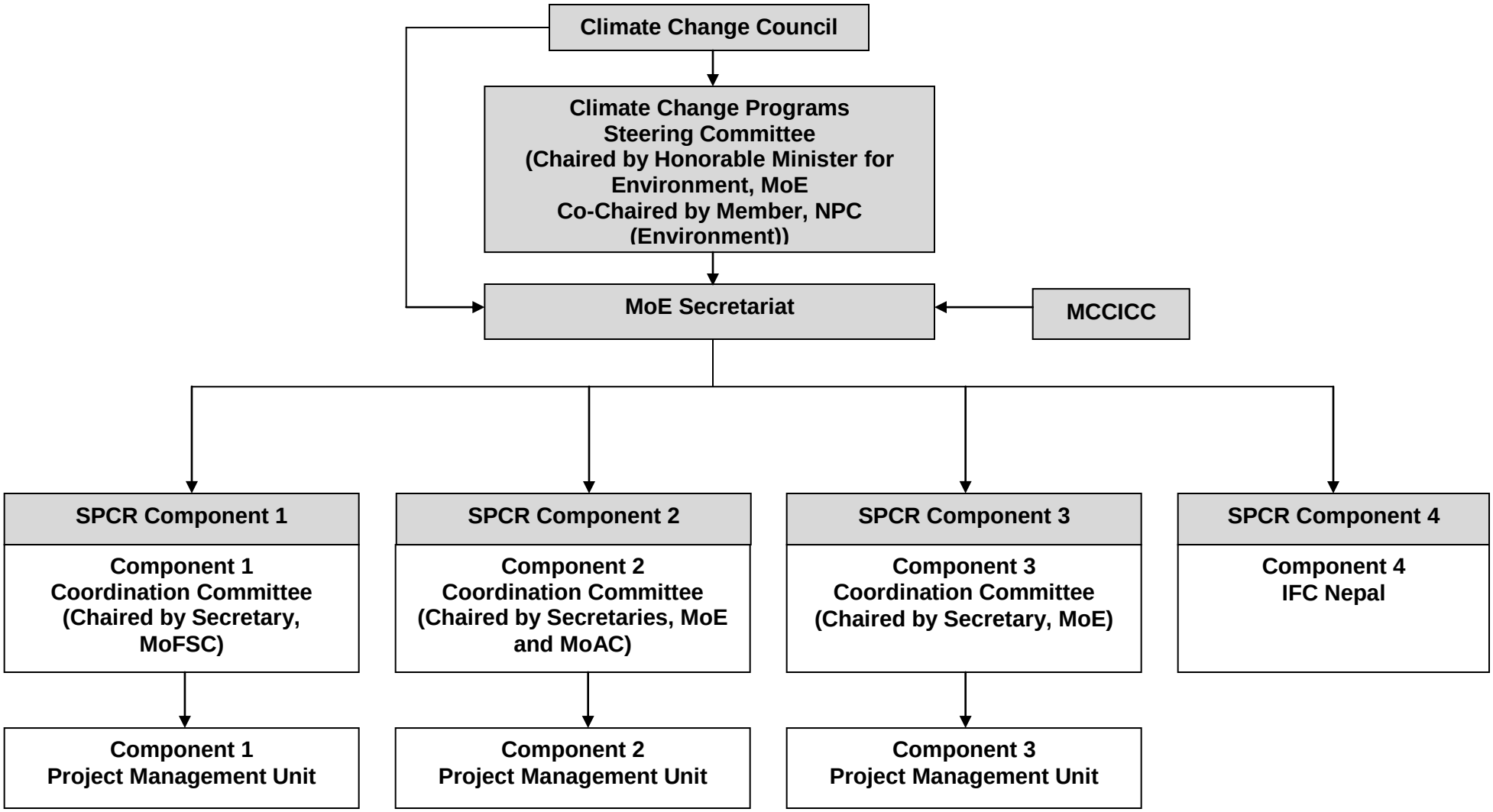
26. This component will improve access to climate resilient technologies and reduce market barriers that prevent the private sector from playing a key role in building climate resilient communities. Activities will focus on investments in climate resilient technologies to support food security, manage disaster risk and promote infrastructure climate proofing, as well as building capacity and enhancing access to finance to build more climate resilient communities. This component will be financed through the IFC. An indicative budget of US $13 million was agreed.

Climate Resilience of Endangered Species

27. The mission held preliminary discussions with MoFSC and UNDP concerning the possibility of a small additional standalone SPCR component to ensure the sustainability and resilience of certain endangered species in the context of climate change. UNDP is in the process of finalizing a proposal for submission to the Global Environment Facility (GEF) for biodiversity corridor management including endangered species. The mission agreed to explore whether CIF/PPCR funds could be allocated to UNDP directly to supplement this proposed project to ensure adequate focus under the GEF-supported project to risks resulting from climate change, e.g., degrading and/or shifting habitats and changing food chains.

3. Tentative Institutional Structure

28. For Components 1 through 3, the SPCR Components will be implemented through designated project management units, with component coordination committees chaired by secretaries of the respective component lead agencies. For Component 4, implementation will be conducted through regular IFC procedures. A climate change program steering committee will monitor results and provide overall coordination and guidance of all climate change programs, including the SPCR. This steering committee will be chaired by the Honorable Minister for Environment and co-chaired by the Member, National Planning Commission (Environment) and will be supported by a well-staffed Secretariat in the Ministry of Environment. The Secretariat will also provide regular updates to the Climate Change Council (CCC) chaired by Rt. Hon'ble Prime Minister and the Multi-stakeholder Climate Change Initiatives Coordination Committee (MCCICC). See organigram on the next page. The mechanisms currently in place for the SPCR preparation phase – a PPCR steering committee and a Policy and Advisory Committee – will continue until the new SPCR implementation arrangements are established.



NEPAL SPCR IMPLEMENTATION ARRANGEMENTS

C. Government Counterpart Staffing

29. The mission and MoE discussed MoE's challenges in managing the growing climate change project portfolio. This will be exacerbated by new sizable programs being developed, namely, the SPCR and DFID/EC climate adaptation program. The mission noted and discussed with MoF that MoE needs additional staffing resources to deliver Nepal's commitments under these programs. For example, it was noted that implementation of component 3 alone would require 5 full-time MoE staff, in addition to consulting support. MoE's coordination role described above would require additional, senior-level staff. The mission strongly requested the Government of Nepal to fill vacant positions in MoE to help narrow the human resources gap. The mission requested the GoN to make necessary arrangement for early decision to establish a department and/or strengthen the existing institutions responsible for promoting climate change and environmental activities. MoF indicated that the decision about creation of a new environment department is pending in MoF and it will look into this in consultation with NPC.

V. NEXT JOINT MISSION

30. The mission agreed with the Government that the next joint ADB/IFC/World Bank mission will be held 9-18 February 2011. Section VI documents steps to be completed beforehand.

VI. FOLLOW UP ACTIONS

31. The actions agreed with the Mission are as follows.

Milestone	Due Date
Mission Follow-Up	
• MoF to confirm aide memoire	28 November 2010
• MoE to circulate final, confirmed aide memoire to all concerned agencies, CSOs, and development partners with request for additional input for next joint mission	3 December 2010
• MoE to convene meeting of PPCR Steering Committee to inform them of mission conclusions and seek feedback on draft SPCR components and institutional structure	15 December 2010
• MoE to consolidate stakeholder comments and submit to MDBs	23 December 2010
• NPC to convene meeting of PPCR Policy and Advisory Committee	31 December 2010
SPCR TA Tasks	
• The ADB consultant economist will deliver a short research paper documenting annual estimates for a recent representative year that reflect national level costs incurred due to (i) water variability- and drought-related crop losses, (ii) weather-related road repairs and (iii) flood damages.	31 December 2010
Component 3: Climate Risk Management TA	
• MoE, with assistance from the SPCR TA team, to revise concept paper to incorporate feedback received during the workshop, and add implementation plan, itemized cost estimate, and initial draft consulting terms of reference.	15 January 2011
• MoE to engage with other relevant ministries, departments, NGOs, and development partners to take stock of ongoing programs/TAs to avoid overlaps/build synergies with the activities for the proposed component.	15 January 2011
• MoE to review ongoing related TAs and discussion among all relevant stakeholders of the lessons learned from those TAs and ways to build on current TA findings in the preparation and implementation of Component 3.	During February 2011 joint mission

Milestone	Due Date
• World Bank to begin assessment of MoE's capacity in financial management, taking into consideration Nepal's finance laws, and roles and responsibilities of related institutions, based on the experience of the ongoing TA and to report its preliminary assessment during the next joint mission.	Starting 15 January 2011
• MoE to prepare a plan for achieving the expected SPCR TA results in interagency coordination	26 January 2011
• MoE to draft and circulate to development partners for comments the norms for participation of Government officials and others in workshops and training events under climate-related TA. These norms include daily subsistence allowance, travel and accommodations, and honoraria for resource persons. MoE to also include norms for short-term technical supporting personnel.	26 January 2011
Possible Component 5 on Endangered Species Biodiversity	
• MoE with assistance of the TA team to draft initial concept paper on biodiversity conservation and livelihoods, in collaboration with MoFSC, MoAC and UNDP.	30 November 2010
Preparations for February 2011 mission	
• MDBs to send MoE draft mission schedule	14 January 2011
• MoE to finalize mission schedule	21 January 2011
• MoE to issue invitations for mission meetings	23 January 2011

VII. ACKNOWLEDGEMENT

32. The mission wishes to convey its appreciation to the Government of Nepal and especially the Ministry of Environment for their cooperation, support, and hospitality during the course of the mission.

Annex 1
PPCR Joint Mission Aide Memoire – 15-21 November 2010
PERSONS MET[1]

Government Line Agencies

Name	Ministry/Department
Hon. Member Dr. Dinesh Chandra Devkota	National Planning Commission (NPC)
Secretary, Mr. Rameshwor Prasad Khanal* Joint Secretary, Mr. Lal Shankar Ghimire* Under Secretary, Mr. Bhuban Karki*	Ministry of Finance (MoF)
Secretary, Dr. Ganesh Raj Joshi* Joint Secretary, Mr. Purushottam Ghimire Joint Secretary, Mr. Batu Krishna Uprety* Statistical Officer, Mr. Ritu Pantha*	Ministry of Environment (MoE)
Secretary, Mr. Purna Kadariya*	Ministry of Physical Planning and Works (MPPW)
Joint Secretary, Dr. Hari Dahal Under Secretary, Dr. Deepak Mani Pokhrel*	Ministry of Agriculture and Cooperatives
Senior Agri Economist, Mr. Kanchan Pandey	Department of Agriculture
Secretary, Yuba Raj Bhusal* Joint Secretary, Mr. Krishna Acharya Joint Secretary, Dr. Ram Prasad Lamsal	Ministry of Forests and Soil Conservation
Planning Officer, Mr. Prakash Nath Pyakuryal* Forest Officer, Mr. Mohan Poudel*	Department of Forests (DoF)
Dr. Jagannath Joshi*	Department of Soil Conservation and Watershed Management
Joint Secretary, Mr. Padam Raj Bhatta	Ministry of Health and Population
Mr. Sanjay Dhungel* Mr. Gautam Rajkarnikar*	Water and Energy Commission Secretariat (WECS)
Joint Secretary, Mr. Mahendra Bahadur Gurung*	Ministry of Irrigation (MoIr)
Director, Mr. Prakash Poudel	Central Regional Irrigation Directorate, Department of Irrigation
Senior Divisional Engineer, Mr. Pravin Aryal	Ministry of Energy
Senior Divisional Engineer, Mr. Thakur Pandit	Department of Water Supply and Sewerage (DWSS)
Deputy Director General, Mr. Gauri Shankar Bassi*	Department of Water Induced Disaster Prevention (DWIDP)
Joint Secretary, Mr. Om Ratna Bajracharya Senior Meteorologist, Mr. Jagadishwar Karmacharya* Senior Divisional Hydrologist, Mr. Bijaya Kumar Pokhrel	Department of Hydrology and Meteorology (DHM)
Senior Agro Scientist, Mr. Ghanashayam Malla*	Nepal Agricultural Research Council (NARC)
Mr. Jay Kumar Ghimire	Ministry of Local Development (MoLD)
Chief, Mr. Dila Ram Bhandari	Seed Quality Control Centre

[1] Persons marked with * attended the wrap-up meeting.

Development Partners

Name	Organization
Mr. Barry J. Hitchcock*	Asian Development Bank
Ms. Christine Kimes*	The World Bank
Mr. Rajeev Gopal* Ms. Albena Melin Mr. Sabin Shrestha	International Finance Corporation
Mr. Vijaya Singh Ms. Anupa Lamichhane	United Nations Development Programme
Ms. Nabina Shrestha	Canadian Cooperation Office
Mr. Bernd Lakemeier	German Technical Cooperation
Mr. Bimal Raj Regmi	Department for International Development
Mr. Jeremy Stone	Netherlands Development organization
Mr. Netra Sharma	USAID

Civil Society Representatives

Name	Organization
Member Secretary, Mr. Juddha Bahadur Gurung	National Trust for Nature Conservation
President, Mr. Netra Timilsina	NGO Federation of Nepal
Program Officer, Mr. Pradeep Paudel	National Association of VDCs in Nepal
Natural Resource Expert/Consultant, Mr. Madhukar Upadhya	CEPAD/National Planning Commission
Mr. Ghana Shyam Gurung Ms. Moon Shrestha Dr. Rinjan Shrestha	World Wildlife Fund
Climate Change and DRR Specialist, Mr. Deepak Paudel	DpNet/NDMF Nepal
Mr. Deepak Lochan Adhikary	International Development Enterprise Nepal
Chief, Mr. Rajendra Khanal	International Union for Conservation of Nature
Senior Program Officer, Mr. Dil Bahadur Khatri	Forest Action
HOP, Mr. Gehendra Gurung	Practical Action
Program Coordinator, Mr. Laba Raj Neupane	Disaster Preparedness Network Nepal (DpNet)
Principal, Dr. Hari Krishna Shrestha	Nepal Engineering College, Pokhara University
Mr. Vijaya Tamila	Kathmandu University

Private Sector Representatives

Name	Organization
President, Mr. Kush Kumar Joshi	Federation of Nepalese Chambers of Commerce and Industry
Team Leader, Prakash Awasthi	LEDCO
Executive Director, Mr. Janak Das Koirala	Nepal Micro Hydropower Association
Business Manager, Mr. Dipendra Pradhan	Bank of Kathmandu
Executive Director, Mr. Khusendra Mahat	SCHEMS
General Secretary/Executive Member, Mr. Shailendra Guragain	Seeds Entrepreneurs' Association of Nepal
Chief Executive Officer, Mr. Suresh B. Shrestha	Standard Nursery
Chief Agriculturist, Mr. Shyam K. Shrestha	CG Seeds

Insurance Advisor, Mr. Hrishi Raj Pant	Premier Insurance
General Manager, Mr. Siddha Raj Panta	Chaudhary Group
Project Manager, Mr. Surya Adhikari	Nepal Hydro
Chief Executive Officer, Mr. Sandeep Giri	Gham Power
Officer, Ms. Moon Pradhan	Gham Power
Managing Director, Mr. Ashok Murarka	Global Seeds
General Manager, Mr. Ashish Sharma	Chaudhary Group
Director, Mr. Sandeep Agrawal	CNI
Director General, Mr. Megh Nath Neupane	CNI
Senior Officer, Mr. Pritha R Thapa	RMDC
Executive, Mr. Ganesh Karki	CEDAN
Chief Executive Officer, Mr. Tej Hari Ghimire	Center for Microfinance
Managing Director, Ms. Puja Chand Thakur	GRID Nepal
Director, Mr. Manish Khemka	CG Seeds
Manager, Mr. Sizen Pudaisaini	NMB Bank
Executive Director, Dr. Purushottam Shrestha	Naya M.L.B.B Bank
Project Manager, Mr. Sher Bahadur Budha	M.K. Hydropower
Hydropower Specialist, Mr. Anand Pradhan	Clean Energy Development Bank
General Manager, Mr. R. Naidu	Himalayan General Insurance
Co-ordinator, Mr. Sanjay Giri	FNCCI
Senior Associate, Mr. Deepak L. Adhikari	IDE
General Manager, Mr. Pranab Pradhan	Himalayan Bamboo Pvt. Ltd
Chairman, Mr. H.D.Pant	Nirdhan Bank
Marketing Manager, Mr. Dharma R. Adhikari	SEAN
Senior Vice President, Mr. Bhupal Shrestha	Premier Insurance
Director, Mr. Dinesh Shrestha	Bira Furniture
Managing Director, Mr. P.B.Shrestha	Bira Furniture
Director, Mr. Rajesh Shrestha	The Standard Nursery
Chief Executive Officer, Mr. Rajesh Pant	Kumari Bank
Executive Director, Mr. Mukunda Bista	CSD
President, Mr. Radhe Shyam Gorkhali	Premier Insurance
Managing Director, Dr. Ram B. Khadka	School of Environmental Science and Management

SPCR Consultants

Name	
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Annex 2
PPCR Joint Mission 15-21 November 2010
Mission Program

Time	Activity	Key Speakers/Discussants
Day 1 (15 November)		
9:00-11:30	Mission kick off meeting and sharing of PPCR Program Objectives	Hon. Dr. Dinesh Chandra Devkota, Secretary, Dr. Ganesh Raj Joshi, Mr. Barry J. Hitchcock (ADB), Ms. Christine Kimes (WB), Mr. Rajeev Gopal (IFC)
12:30–4:30	Consultation meeting on Component 1: Building Climate Resilience of Watersheds and Water Resources in Mountain Eco-Regions	Mr. Batu Krishna Uprety (Chair) & Mr. Purushottam Ghimire (Summary of discussion)
5:00-6:30	Joint discussion on the findings from the consultation on Component 1	MoE & Mission team
Day 2 (16 November)		
9:00-10:30	Joint meeting with Mr. Bhuwan Karki, Under Secretary MoF & CIF Focal Person	Mr. Purushottam Ghimire, Mr. Batu K. Uprety, Mr. Bhuwan Karki & Mission Team
11:00-2:00	Consultation meeting on Component 2: Building Resilience to Climate-Related Extreme Events	Mr. Purushottam Ghimire (Chair), participants & Mission Team
3:00 - 5:00	Consultation meeting on component 3: Mainstreaming Climate Risk Management in Development	Mr. Purushottam Ghimire (Chair), participants & Mission Team
Day 3 (17 November)		
10:30-1:30	Consultation meeting on Component 4: Building Climate Resilient Communities through Private Sector Participation	Mr. Purushottam Ghimire, Mr. Batu K. Uprety, Mr. Bhuwan Karki, participants & Mission Team
2:30-5:00	Consultation meeting with CSOs	Mr. Purushottam Ghimire, Civil Society Representatives and Mission Team
5:30-6:30	Joint meeting with MoFSC & DSCWM	MoE and Mission Team

Day 4 (18 November)		
9:00 - 11:00	Consultation meeting with Development Partners	Mr. Purushottam Ghimire, Development Partners, and Mission Team
11:00-2:00	Joint meeting with MoE & SPCR TA team	MoE and Mission Team

Day 5 (19 November)		
12:00-1:30	Meeting with UNDP representatives	UNDP team and Mission Team
2:00-400	Joint meeting with MoFSC & DSCWM	MoE and Mission Team
400-5:00	Joint meeting with MoE team	Mission team

Day 6 (20 November)		
12:00-1:30	Pre-wrap up meeting with MoE	Mission Team

Day 7 (21 November)		
12:00-1:30	Courtesy call with Hon. Dr. Devkota, NPC	Mission Team
2:00-4:00	Final wrap-up meeting	MoE, MoF, PMO and other relevant ministries/departments and Mission Team

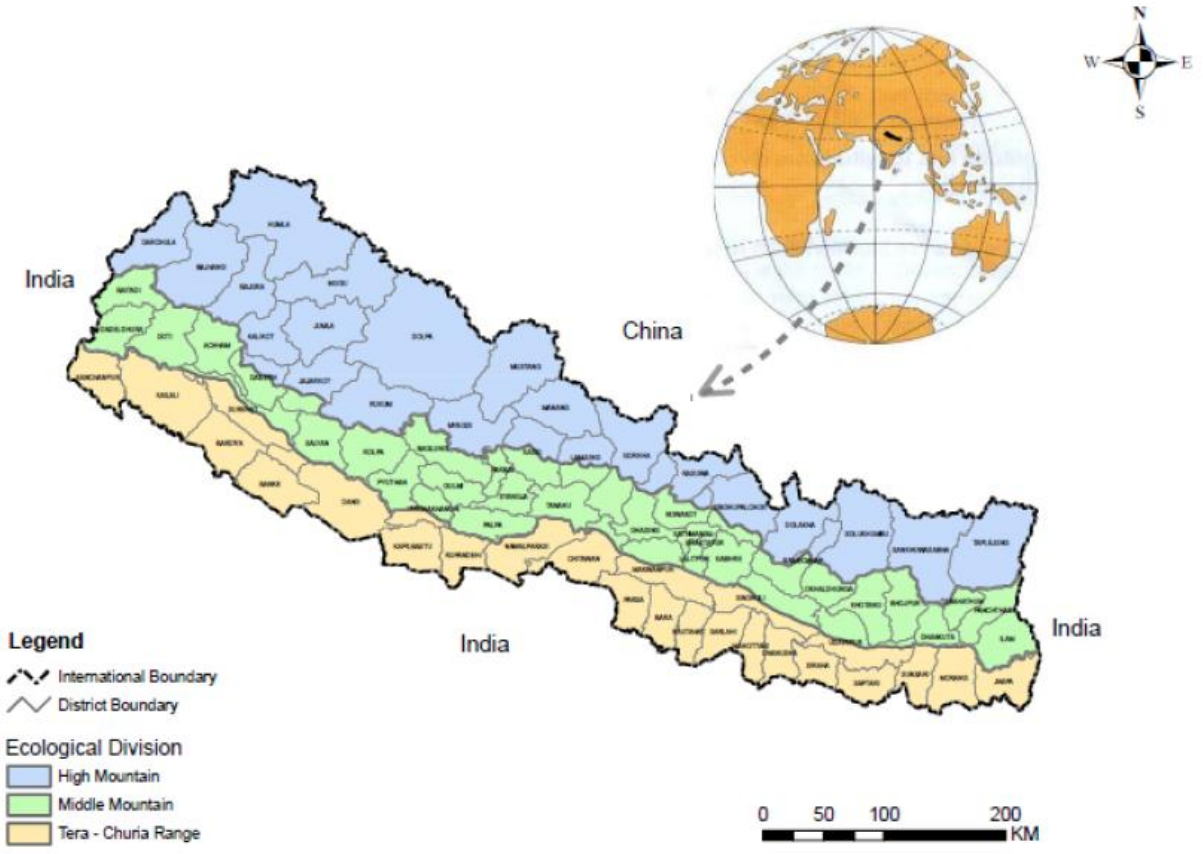
Part 1 – Nepal's *Strategic Program for Climate Resilience - Consultative Draft (20/11/10)*

Nepal's *Strategic Program for Climate Resilience:* A Mountain Ecosystem Approach to Building Resilience in Vulnerable Communities

Part 1 – Background and Rationale

Section 1 - Country Circumstances

1. Nepal is a land-locked country situated in the central part of the Himalayas stretching between $26^0$22' and $30^0$27' N latitudes and $80^0$40' and $88^0$12' E longitudes with an altitudinal range from 60m in the south to 8,848m in the north (Fig. 1). The country is bordered by India in the east, west and south, and the People's Republic of China in the north. The country is 850 kilometers (km) long (east-west) and experiences a wide range of climates varying from the sub-tropical in the south to the alpine type in the mountains (which includes Mt. Everest the world's highest mountain peak) within a span of less than 200 km (north-south).



2. The Himalayas in Nepal are considered to be the youngest mountain system in the world. The Himalaya Mountains at present shows little tectonic activity, upheaval has not

completely ceased and small spasmodic rises still occur making the Nepal Himalaya relatively stable.

3. Covering an area of 147,181 km^2, Nepal is broadly divided into three ecological regions: the ***Churia/Terai range*** (plain area, 23% of the total area), the ***Middle Mountains*** (42% of the total area) and the ***High Mountains*** (35% of the total area) that is made up of five physiographic regions: High Himal, High Mountain, Middle Mountain, Siwalik (the Churia Range), and the Terai (Figure 1). Each of the physiographic regions has a distinct altitude and climatic characteristics that vary from sub-tropical to alpine conditions within a lateral span of less than 200 km. Table 1.1 shows the characteristics in different ecological belts of Nepal.

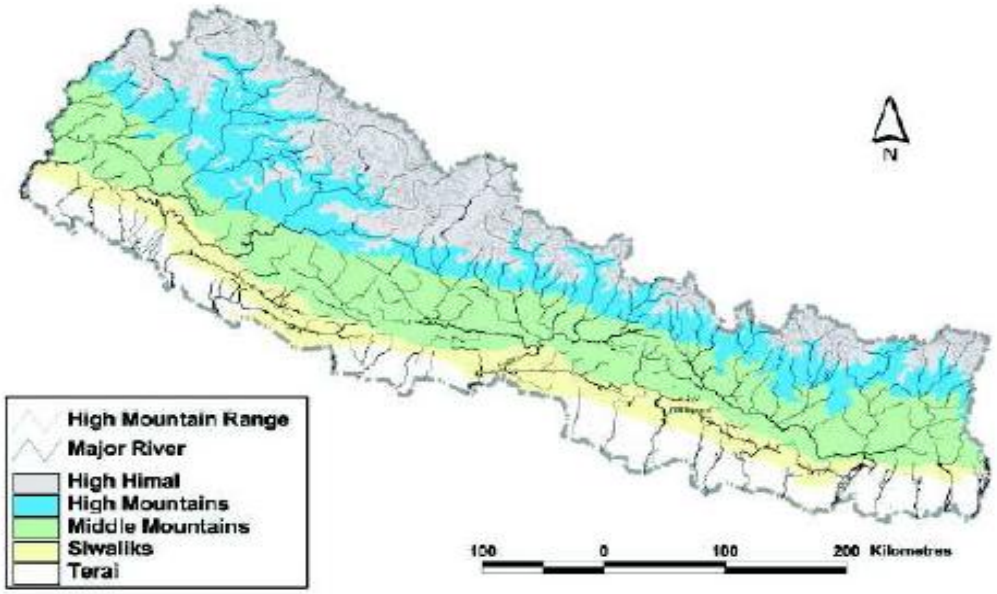


Figure 1: Physiographic Characteristics of Nepal (insert better quality map)

Table 1: Areas and Population by Physiographic Regions

Physiographic Region	Area	Share	Number of Districts	Population[1]	Share	Population Density
	km^2	%		Million	%	Persons/km^2
High Mountains	51,817	35.2	16	1.7	7.3	33
Mid. Mountains	61,345	41.7	39	10.3	44.3	167
Churia/Terai	34,019	23.1	20	11.3	48.4	330
Total / average	**147,181**	**100**	**75**	**23.3**	**100**	**157**

[1] According to the last census of 2001

1.1. Population

4. The projected population of Nepal as of August 2010 is 28 million. Nepal ranks 193 out of 210 countries in terms of Gross National Income per capita adjusted for purchasing power and more than 70% of people live on less than US$ 2 per day.

5. The population is predominantly rural with some urban centers such as the Kathmandu Valley gaining in inhabitants at the expense of rural areas. The Census of 2001 indicated that 14% of Nepal's population was urban. However, migration to cities and valleys has been increased tremendously in the past decade. Rural population is engaged in farming, predominantly for subsistence, and the agriculture sector is the second largest contributor (33%) to the gross domestic product (GDP). The urban sector contributes the remaining share of the GDP (services-50% and industry-23%). Tourism contributes significantly to Nepal's income with receipts in 2000 amounting to 15% of exports.

6. The natural migration trend to the cities and valleys was fuelled by the decade long insurgency. The Census reports showed that 1.72 million people (7.4 % of the total population) migrated internally in 2001. This compares with the situation in 1996 when internal migration was estimated in the range of 22 %[1]. The rise of economic activities and the rapid expansion of services in cities and small towns has encouraged this internal migration in recent years and has heavily influenced investment trends and urban/rural development strategies and policies.

7. Nepal in essence is a cultural mosaic comprising different castes and ethnic groups belonging to the Tibeto-Burman and Indo-Aryan linguistic families, which is indicative of the waves of migration that have occurred for over 2000 years from the north and south respectively. Although intermingling between the various groups has occurred, Nepal's population varies widely in religious and culture aspects, combining elements of Hinduism, Buddhism and Islam picked up through cultural contacts over the years. In addition, migration of the hill and mountain people into the Terai since the 1960s has added a new dimension to the social landscape resulting in an extremely heterogeneous and complex Terai population.

8. Overall Human Development Index (HDI) (which includes life expectancy, literacy rate and per capita income) of Nepal is 0.509. HDI throughout the country varies widely along the urban-rural divide, by ecological belt, and by development region and sub-regions. On average, urban dwellers are experiencing slightly higher human development than their rural counterparts (0.630 vs. 0.482) due to better access to infrastructure and services (Fig. 2). Among the development regions, the Mid-Western region has the lowest level of development.

[1] Population Study Central Department Study (1996)

Figure 2: HDI by Geographic Region in Nepal *(Source: UNDP Nepal, 2009)*

1.2. Poverty

9. Poverty has multi-dimensional causes and manifestations in Nepal. The level of rural poverty is almost twice as high as that of urban poverty and the mountain area presents the highest incidence of poverty in the country[2]. The majority of rural poor are engaged in subsistence agriculture and related activities, making them highly vulnerable to climate change[3]. Three and a half million people are considered moderately to severely food insecure. Evidences suggest that even after the implementation of 10 periodic plans and putting substantial efforts in development endeavours, national efforts to reduce poverty have resulted in little meaningful improvement. The 2009 Human Development Index ranks Nepal at 144 out of 182 countries. Fig. 3 shows Nepal' HDI and per capita GDP compared to Bangladesh which has also been selected as a PPCR pilot country.

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[2] Chhetry, D., *Understanding Rural Poverty In Nepal, Defining and Agenda for Poverty Reduction*, Proceedings of the First Asia and Pacific Forum on Poverty (Volume I)

[3] *Climate Change and Agriculture Country Note – Nepal*. This Country Note was produced by a World Bank team led by Animesh Shrivastava, comprising Cristina Dengel, Jitendra Srivastava, under SASDA Sector Manager Simeon Kacou Ehui.

Table 2: Nepal's Human Development Index				
HDI value	**Life expectancy at birth (years)**	**Adult literacy rate (% ages 15 and above)**	**Combined gross enrolment ratio (%)**	**GDP per capita (PPP US$)**
1. Norway (0.971)	1. Japan (82.7)	1. Georgia (100.0)	1. Australia (114.2)	1. Liechtenstein (85,382)
142. Swaziland (0.572)	113. Guyana (66.5)	128. Yemen (58.9)	134. India (61.0)	163. Uganda (1,059)
143. Angola (0.564)	114. Tajikistan (66.4)	129. Papua New Guinea (57.8)	135. Morocco (61.0)	164. Afghanistan (1,054)
144. Nepal (0.553)	115. Nepal (66.3)	130. Nepal (56.5)	136. Nepal (60.8)	165. Nepal (1,049)
145. Madagascar (0.543)	116. Mongolia (66.2)	131. Mauritania (55.8)	137. Swaziland (60.1)	166. Madagascar (932)
146. Bangladesh (0.543)	117. Pakistan (66.2)	132. Morocco (55.6)	138. Kenya (59.6)	167. Myanmar (904)
182. Niger (0.340)	176. Afghanistan (43.6)	151. Mali (26.2)	177. Djibouti (25.5)	181. Congo (Democratic Republic of the) (298)

Source: 2009 Poverty and Human Development Report.
Note : The number prior to the country indicates the rank while the value in the parenthesis indicates HDI

10. The Human Poverty Index (HPI-1)[4] ranks Nepal 99th among 135 countries for which the index has been calculated. Table 2 shows the values for Nepal and compares them to other countries. The situation in this land-locked nation is regarded as "serious" and "alarming" under the 2009 Global Hunger Index[5] (Table 3).

[4] The HPI-1 measures severe deprivation in health by the proportion of people who are not expected to survive to age 40. Education is measured by the adult illiteracy rate. And a decent standard of living is measured by the underweight average of people not using an improved water source and the proportion of children under age 5 who are underweight for their age.

[5] http://www.wfp.org/countries/nepal

Table 3: Selected Indicators of Human Poverty for Nepal				
Human Poverty Index (HPI-1)	**Probability of not surviving to age 40 (%)**	**Adult illiteracy rate (%ages 15 and above)**	**People not using an improved water source (%)**	**Children underweight for age (% aged under 5)**
1. Czech Republic (1.5)	1. Hong Kong, China (SAR) (1.4)	1. Georgia (0.0)	1. Barbados (0)	1. Croatia (1)
97. Haiti (31.5)	88. Uzbekistan (10.7)	128. Yemen (41.1)	71. Venezuela (Bolivarian Republic of) (10)	125. Pakistan (38)
98. Equatorial Guinea (31.9)	89. El Salvador (10.7)	129. Papua New Guinea (42.2)	72. Occupied Palestinian Territories (11)	126. Ethiopia (38)
99. Nepal (32.1)	90. Nepal (11.0)	130. Nepal (43.5)	73. Nepal (11)	127. Nepal (39)
100. Rwanda (32.9)	91. Kazakhstan (11.2)	131. Mauritania (44.2)	74. Kyrgyzstan (11)	128. Burundi (39)
101. Pakistan (33.4)	92. Guatemala (11.2)	132. Morocco (44.4)	75. Syrian Arab Republic (11)	129. Afghanistan (39)
135. Afghanistan (59.8)	153. Lesotho (47.4)	151. Mali (73.8)	150. Afghanistan (78)	138. Bangladesh (48)

Source: 2009 Poverty and Human Development Report.

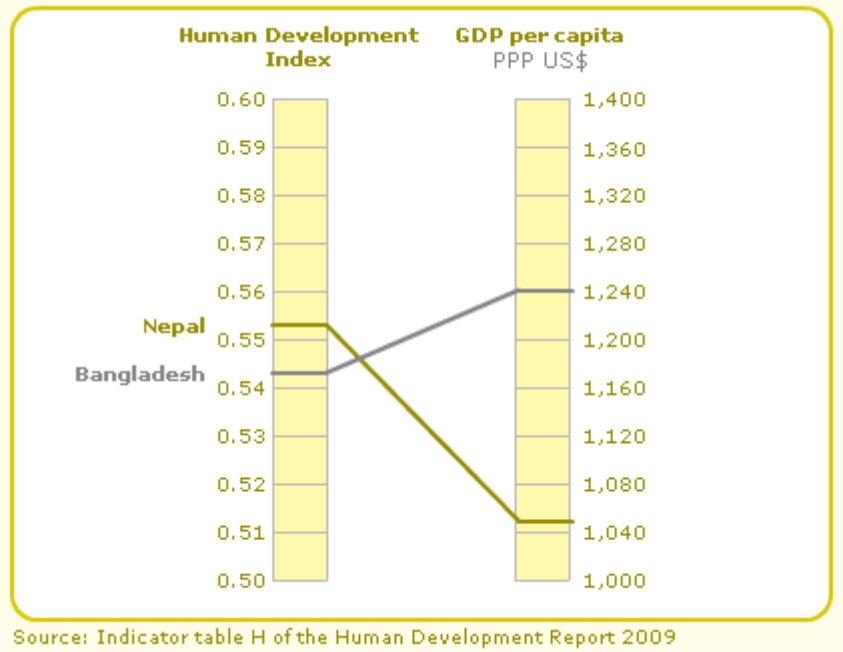


Fig. 3 – Comparison of HDI and Per Capita GDP between PPCR Pilot Countries Nepal and Bangladesh

11. Nepal, with an annual per capita gross domestic product (GDP) estimated at about US$272, is the poorest country in South Asia and the twelfth poorest country in the world. Poverty is widespread with about 30.9% of the population living below the prescribed poverty line. Only 26% of Nepal's women are literate, compared to 62% of men. Agriculture is the main source of livelihood for a majority of the population and more than 80% of the population is engaged in agriculture, which is still the largest sector of the economy, having a share of around 35% of the GDP. About 40% of the population has access to electricity but the gap between urban access (87%) and rural access (27%) is very large. Moreover, the Nepalese are the lowest per capita electricity users in South Asia (about 70 kilowatt-hours per year). Natural resource use and livelihoods are closely linked. The majority of people still depend on forests for firewood as well as for timber, medicinal plants, and forestry products. They also use forests to graze livestock and to collect fodder to feed the large number of livestock raised to supply the manure essential for agricultural crops.

12. The prevalence of hunger varies substantially across the fifteen sub-regions of Nepal. The highest prevalence of hunger can be found in the Far and Mid-Western Hill and Mountain regions. The hunger indices in these parts of the country are close to or above 30, pointing to an extremely alarming situation[6]. Of the 16 countries listed globally as being at "extreme" risk from climate change over the next 30 years, Nepal falls in fourth position based on the Climate Change Vulnerability Index, compiled by the British-based global risks advisory firm, Maplecroft[7], with ***poverty and adaptive capacity being some of the key determining factors in the ranking***[8].

1.3. Economy

13. Agriculture, fisheries and farming are the mainstays of Nepal's economy, providing a livelihood for almost three-fourths of the general populace and accounting for 38 per cent of Gross Domestic Product (GDP). Industrial activity mainly involves the processing of agricultural, fisheries and natural resource products, including pulses, jute, sugarcane, tobacco, and grain. Bumper crops, better security, improved transportation, and increased tourism and transportation pushed Nepal's economic growth past 5 per cent in 2008, after growth had hovered around 2.6 per cent - barely above the rate of general populace

[6] *The Food Security Atlas of Nepal*, Food Security Monitoring Task Force. NPC, 2010 (p 2).

[7] http://www.maplecroft.com/about/news/ccvi.html/

[8] The *Climate Change Vulnerability Index* evaluates 42 social, economic and environmental factors to assess national vulnerabilities across three core areas. These include: exposure to climate-related natural disasters and sea-level rise; human sensitivity, in terms of population patterns, development, natural resources, agricultural dependency and conflicts; thirdly, the index assesses future vulnerability by considering the adaptive capacity of a country's government and infrastructure to combat climate change. According to Maplecroft, the countries with the most risk are characterised by high levels of poverty, dense populations, exposure to climate-related events; and their reliance on flood and drought prone agricultural land.

growth - for the previous three years. The deteriorating global economy in 2009 has impacted tourism and transportation and remittance growth, a key source of foreign currency exchange.

14. Economic activities remain constrained in Nepal. GDP growth for FY10 is now projected to be 3-3.5 percent, from 5.3 percent in FY08 - when the economy briefly enjoyed peace dividends boosted by good weather. High remittances estimated to exceed a quarter of GDP have helped reduce poverty (from 42 percent in 1996 to 31 percent in 2004) and keep the economy afloat. Prolonged drought and unseasonal rains adversely affected Nepal's largely rain-fed agriculture, which contributes 33 percent of GDP. Paddy production, which accounts for 21 percent of agricultural output, fell by 11 percent in FY10. The production of wheat (7.1 percent of total output) and maize (6.8 percent) also declined. A grain deficit of 400,000 tons is expected in FY10, yet there has been little or no new investment to mitigate the effects of weather. Tea production has experienced an estimated 20% reduction in yield due to unfavourable weather conditions. Investment in agriculture and irrigation remained at low averages of 0.52 percent and 0.55 percent of GDP, respectively, between FY07 and FY09[9]. Industrial growth tumbled from 4.0 percent in FY07 to 1.8 percent in FY08, and stagnated in FY09. Social spending increased from 6 percent of GDP to 10 percent, and is budgeted to reach 12 percent of GDP in FY10 - with an increasing amount focused on community based management (Box 1). Besides education and health, funds were also used for expanding safety nets (support for widows, single women, the disabled and marginalized ethnic groups). Spending on safety nets increased by five times between FY07-09, from 0.1 percent of GDP to 0.5 percent and is expected to reach 0.9 percent in FY10. The targeting of programs has improved to ensure support for children (age 4 to 15), those affected by conflict, those from low Human Development Indicator districts, and children with special needs. Inflation has remained in double digits since mid-2008. CPI rose by 11.8 percent year-on-year in January 2010, compared to 14.4 percent in January 2009. Food prices, which have the highest weight in the CPI (53.2 percent), explained the inflation. The index for food and beverages rose by 18.1 percent in 12 months till January 2010, almost equal to the rise in the same year-earlier period. Prices of non-food items rose by 4.5 percent during the same period, lower by almost five percentage points compared with the same year-earlier period. Nepal has considerable scope for exploiting its potential in hydropower and tourism and transportation, areas of recent Foreign Direct Investment (FDI) interest. Prospects for foreign trade (imports and exports) or investment in other sectors will remain poor, however, because of the small size of its economy, its technological backwardness, its remoteness and landlocked geographic location, its civil strife and workforce unrest, and its susceptibility to natural disaster.

15. The labour situation in Nepal is characterized by rapidly growing labour forces (more than 3 % per annum). There is insufficient growth in employment generation, particularly in non-agricultural sectors. Although women's participation in the labour market is increasing due to the change of economic base from agriculture to industry, the economy continues to experience problems affecting the labour market concerning competitiveness, motivation, creativity and labour flexibility.

[9] *Nepal Economic Update*. World Bank. April 2010.

16. Private sector development (PSD) is central to securing and sustaining economic growth in post-conflict Nepal. Though the decade long conflict had severely crippled the private sector, it continues to play a key role to play in poverty reduction in Nepal and is the main employment provider in the country. Increased involvement of the private sector in the economy and the divesting of inefficient state enterprises are important measures for reducing the Government's fiscal burden and freeing up public money for redeployment in the social sectors such as education and health, and for improving the delivery of essential services to support and encourage community develop.

Community-Managed Development
(Source: *Nepal Economic Update*. World Bank April 2010)

Since 1998, the government of Nepal has been trying to channelize self-help - a characteristic of Nepali society - for development. The *Local Self Governance Act* was the first step in taking resources closer to the people. It became a major policy focus when the civil conflict intensified and has continued after peace was achieved, in 2006. Resource flows to communities for local needs-based programs rose from 1 percent of total expenditure in FY00 to 7 percent in FY09. It is budgeted to increase to 8 percent in FY10, and is expected to increase further in the next Three-Year Plan (2010/2011 - 2012/2013). That plan has employment, inclusive of service delivery and broad-based development, as a major development outcome. The impact of the community-managed programs is already visible. About 500-750 km of rural roads (including track openings) have been built each year; one third of all schools are now community managed; all of the country's 75 districts are now covered by the community-based integrated health and nutrition management network to reduce child illness, small-hydropower plants in isolated communities generate over 4.5 MW of electricity, and there are hundreds of small units supplying electricity to individual communities. Starting from FY 11, Nepal aims to have a micro-hydro unit in each village managed by community.

1.4. Natural Resources – Forest, Ecosystems and Biodiversity

17. Nepal comprises only about 0.1 per cent of the terrestrial area of the earth but harbors a high share of the world's biodiversity. A total of 118 ecosystems have been identified, with 75 vegetation types and 35 forest types. Species richness among floral diversity comprises Bryophytes 5.1%, Pteridophytes 3.4%, Gymnosperms 5.1% and Angiosperms 2.7%. Faunal diversity includes, for example, fishes 1%, Birds 9.3% and Mammals 4.5% (HMG/MFSC, 2002)[10]. Several critically endangered species are found in Nepal including the **snow leopard** (*Uncia uncia*) and the **Asian One-horned Rhinoceros** (*Rhinoceros unicornis*) – both threatened by climate change impacts on their natural habitats and food sources.

1.5. Geo-physical Elements (Mountain Regions/Watersheds)

18. The physiographic zone of Nepal is divided into Terai, Siwalik (Churia), Middle Mountain, High Mountain and High Himal, from south to north respectively. Similarly, there exist three distinct ecological zones, namely ***Churia-Terai Range*** (also known as foothills / Siwalik), ***Middle Mountain*** (includes Mahabharat Range and Midlands) and ***High Mountain*** (includes also snow peaks). In terms of geological setting, Nepal is sub-divided in to five tectonic zones, which also roughly correspond to the physiographic and ecologic zones (see Table below). Each of these geologic units are demarcated by geological fault structures, which are

[10] Nepal Biodiversity Strategy, HMG/MFSC, 2002

responsible for on-going mountain building process caused by the collision of Indian and Tibetan plates. The geologic, physiographic and ecologic zones are extended in east-west direction through out the country forming distinct area of diverse characteristic whose brief descriptions are presented below.

Table 4: Geologic and Physiographic Units of Nepal

Geological Unit (South to North)	Physiographic Units (South to North)	Width (km)	Altitude Range (meters above sea level)
Terai	**Churia-Terai Range** (includes Dun Valleys)	Terai: 10-50	60-200
Siwalik Zone		Churia:10-50 Dune Valleys: 5-30	200-1300
Lesser Himalayan Zone	**Middle Mountain** (includes Mahabharat Range and Midlands)	Mahabharat Range: 10-35 Midlands: 40-60	1000-3000
Higher Himalayan Zone	**High Mountain** (includes snow peaks)	10-60	> 3000
Tibetan Tethys Himalayan Zone			

Churia-Terai Range

19. The tectonic unit **Terai** is an almost flat land covered with thick deposit (about 1500 m) of alternating sequence of sand and gravel developing shallow and deep aquifers to store huge amount of groundwater. The area is heavily cultivated and is the major food grain production area in Nepal. About 48 % of the total population are residing in Terai. The Himalayan Frontal Thrust (HFT), a reverse fault structure marks the boundary between the Terai and southern boarder of Siwaliks.

20. Lying to the north of Terai, the tectonic unit **Siwaliks (Churia)** forms the youngest mountain belt in the Himalayan region. Mountain building process is still going on. These hills are the first monsoon barriers causing heavy precipitation in the area. The foothills of Churia serves as water recharge area for Terai. The hills are composed of easily erodeable sedimentary rocks that have developed steep slopes at several locations. Since the zone is overlying the most active fault, known as Himalayan Frontal Thrust, of the Himalayan region, the zone is also seismically active and earthquake prone. Earthquakes, even of small magnitude, produce cracks on rocks which go on enlarging during each seismic event. This makes rocks susceptible to landslides and debris flow during the rainy seasons. Major climate change risks of the zone include debris flows, landslides and soil erosion which ultimately deposit sediments on the cultivated land in the Terai. The zone contains Dune Valleys which could be of prime importance to manage migration caused by drying out of springs (drinking water) in hill slopes. Rivers originated in this zone are seasonal. The area suffered from intense

human encroachment. The Main Boundary Thrust (MBT), a reverse fault structure, marks the boundary with the overlying Lesser Himalayan Zone.

21. Flooding, river course shifting, drought, landslides, prevalence of insect and diseases in agriculture, water quality degradation, vector and water borne diseases and forest fire and degradation of ecosystems are the major climate change risks of this region. These risks have collectively affected marginalized, indigenous and poor people's livelihoods, increased food insecurity and impact in human and livestock health. In some part, ground water recharge is excessive due to inundation causing standing water and vector and water borne diseases where as in other parts declining of ground recharge due to drought has been reported.

Middle Mountain

22. Lying to the north of the Siwaliks (Churia), the **Lesser Himalayan Zone** consists of sedimentary, igneous and metamorphic rocks which are faulted, folded and jointed at places. Presence of easily weathered rock types have resulted gently sloping terraces which are intensively cultivated land through out. About 44 % of the total population resides in this belt. Steep rock slope, intense precipitation, narrow river channels have made the zone prone to mass movement hazard. Many of the rivers originated in this zone are perennial. The Main Central Thrust (MCT), a reverse fault structure, marks its northern boundary with the overlying Higher Himalayan Zone.

23. Increase in the frequency of landslides, drying out of springs and decline in cultivated crop production are major consequences of climate change. In addition, drought, prevalence of insects and diseases in agriculture, water quality degradation, vector and water borne diseases, forest fire and degradation of ecosystems are the major climate change risks of this region. These risks have collectively (and disproportionately) affected marginalized, indigenous and poor people's livelihoods, increased food insecurity and affected human and livestock health. These risks are likely to increase social/natural resource conflict and have already compelled sporadic migration which is expected to increase in future. Main cities like Kathmandu and Pokhara are already vulnerable due to poor water quality and general water shortages. This vulnerability will be further aggravated by changing precipitation patterns due to climate change. Kathmandu valley is experiencing a progressing decline in ground water resources which will continue due to changes in precipitation and reduced ground water recharge from climate change.

High Mountain

24. Lying to the north of Lesser Himalayan Zone are the tectonic units **Higher Himalayan** and **Tibetan Tethys Himalayan Zone**. The Higher Himalayan Zone is consisted of metamorphic rocks where as the Tibetan Tethys Himalayan Zone is composed of sedimentary, igneous and metamorphic rocks. The South Tibetan Detachment System (STDS), a normal fault structure, forms the boundary between these two zones. Steep topography, intense physical weathering, deep river gorge, snow peaks, glacial lakes, glaciers and high elevation are characteristic features of these zones. Only a few sporadic villages are their providing residences to about 8 % of the total population. All the rivers originated in this zone are snow-fed.

25. Glacial melting and Glacial Lake Outburst Floods (GLOF) are the major risks of climate change in this region. Livestock production is declining due to the increase in animal diseases, coupled with continued water shortages and rangeland degradation (due to invasive species associate with climate variability). Drought, increased prevalence of insect and diseases in agriculture and water quality degradation are the principal climate change risks affecting this region. These risks have collectively affected mountain communities and their livelihoods, and have compelled sporadic migration which is expected to increase in future (see Annex 9).

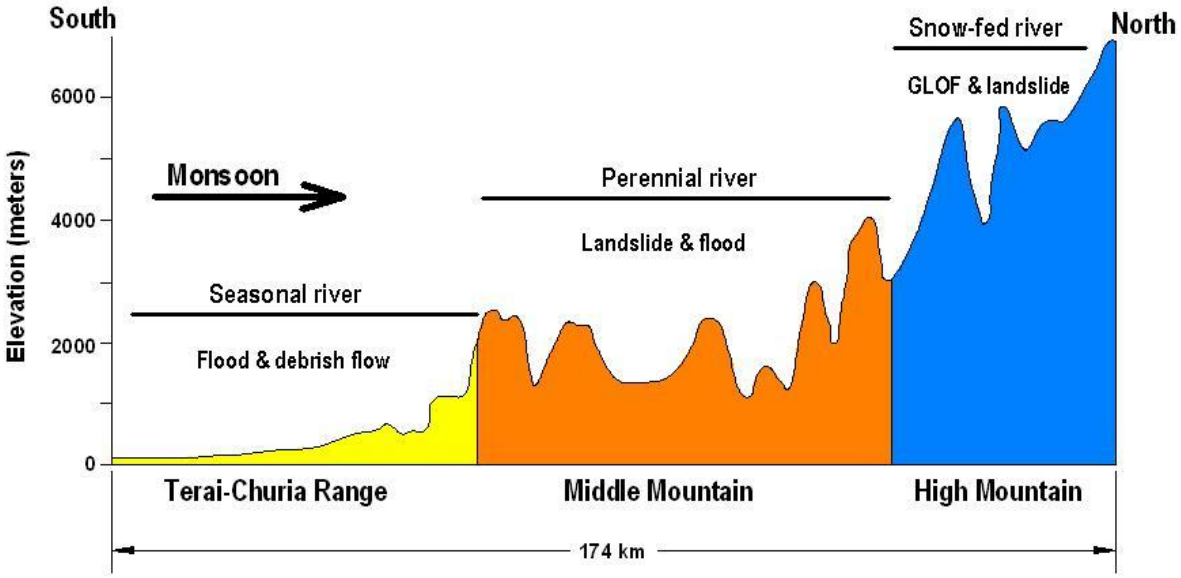


Figure 4: South (Birganj) - North (Langtang-Himal) Topographical Cross-Section Showing Major Climate Change Risks and Nature of Rivers in Each Ecological Zone.

1.6. River Systems in Nepal

26. The Himalaya region, also known as the 'third pole' or 'Water Tower of Asia' as it has the most highly glaciated area in the world outside of the to Polar regions, has huge stocks of water in the form of snow and ice, with a total area of 35,110 square km of glacier and ice cover, and a total ice reserve of 3,735 cubic km[11]. The Hindu Kush-Himalayan region contributes the headwaters of the 10 largest Asian river basins.

27. The river basins in Nepal are spread over a diverse and extreme geographical and climatic condition that the potential benefits of water are accompanied by risks. Though the available surface water of Nepal (202 km3) could fulfill the demand of the country up to the end of 21st century, the availability of only 26 km3 water in dry season shows that water scarcity is imminent in Nepal unless water resources are properly managed.

28. The 3,252 glaciers in Nepal cover a total area of 5,323 square kilometers and supply meltwaters to feed the extensive river network that covers the country. Nepal has more than

[11] Xu,J.C., Shrestha A., Vaidya R., Eriksson, M and Hewitt, K 2007. *The Melting Himalayas – Regional Challenges and Local Impacts of Climate Change on Mountain Ecosystems and Livelihoods*. ICIMOD, Technical Paper, ICIMOD, Kathmandu

6,000 rivers, which provide a dense network of rivers with steep topographic conditions. All the river systems drain from north to south towards the Ganges. The four major river systems, the Mahakali, Karnali, Narayani (Gandaki) and Saptakosi, all predate the uplift of the main Himalayan ranges and cut through the mountain ranges to form deep river valleys. The other medium rivers originating from the Mahabharat range are Kankai, Kamala, Bagmati, West Rapti and Babai. The southern rivers rising from the Siwalik range have little water during dry season, but they cause flash floods during monsoon. Although the total average annual runoff from all these river systems is estimated at about 225 billion cubic meters (Bm^3), only a small part of it (estimated at 15 Bm^3) has so far been used for economic and social purposes[12].

29. Nepal has three categories of rivers. The largest systems - from east to west Koshi, Gandaki/Narayani, Karnali - originate in multiple tributaries rising in or beyond the *High Mountain* that maintain substantial flows from snowmelt. The total outflow of water from these 3 rivers is about 170 billion cubic meters which is approximately 82% of total run off[13]. They ultimately become major tributaries of the Ganges River in northern India. After plunging through deep gorges, these rivers deposit their heavy sediments and debris on the plains, thereby nurturing them and renewing their alluvial soil fertility. Once they reach the ***Terai Region***, they often overflow their banks onto wide floodplains during the summer monsoon season, periodically shifting their courses.

30. The eastern part of the country is drained by the **Kosi River**, which has seven tributaries. It is locally known as the Sapt Kosi, which means seven Kosi rivers (Tamor, Likhu Khola, Dudh, Sun, Indrawati, Tama, and Arun). The Gandaki /Narayani River drains the central part of Nepal and also has seven major tributaries (Daraudi, Seti, Madi, Kali, Marsyandi, Budhi, and Trisuli). The river system draining the western part of Nepal is the Karnali. Its three immediate tributaries are the Bheri, Seti, and Karnali rivers, the latter being the major one.

31. Second category rivers rise in the Middle mountains, from east to west the *Mechi*, *Kankai* and *Kamala* south of the Kosi; the *Bagmati* that drains Kathmandu Valley between the Kosi and Gandaki systems, then the East Rapti (in Chitwan), the *West Rapti* (Dang) and the *Babai* are other important rivers. Without glacial sources, annual flow regimes in these rivers are more variable although limited flow persists through the dry season. These rivers, however, contribute in irrigating crop field and have helped in maintaining ecosystems health of nearby geographical areas.

32. The third category of rivers rise in the outermost low mountain (Churia/*Siwalik* foothills) and are mostly seasonal. These rivers are mostly active during monsoon and they are major threats for flash floods and debris flow in the Terai region.

33. Most of the rivers flow from north to south and their characteristics are determined by the geology from where they flow; precipitation patterns affecting the river basins; and the slope of terrain they pass through. Due to these features, each river is likely to have unique features in the context of climate change and climate variability. Hence, the upstream and downstream relations and consequences in these rivers may differ widely.

[12] *National Water Plan.* 2005.
[13] *Economic Geography of Nepal.* S.H. Shrestha. 2004.

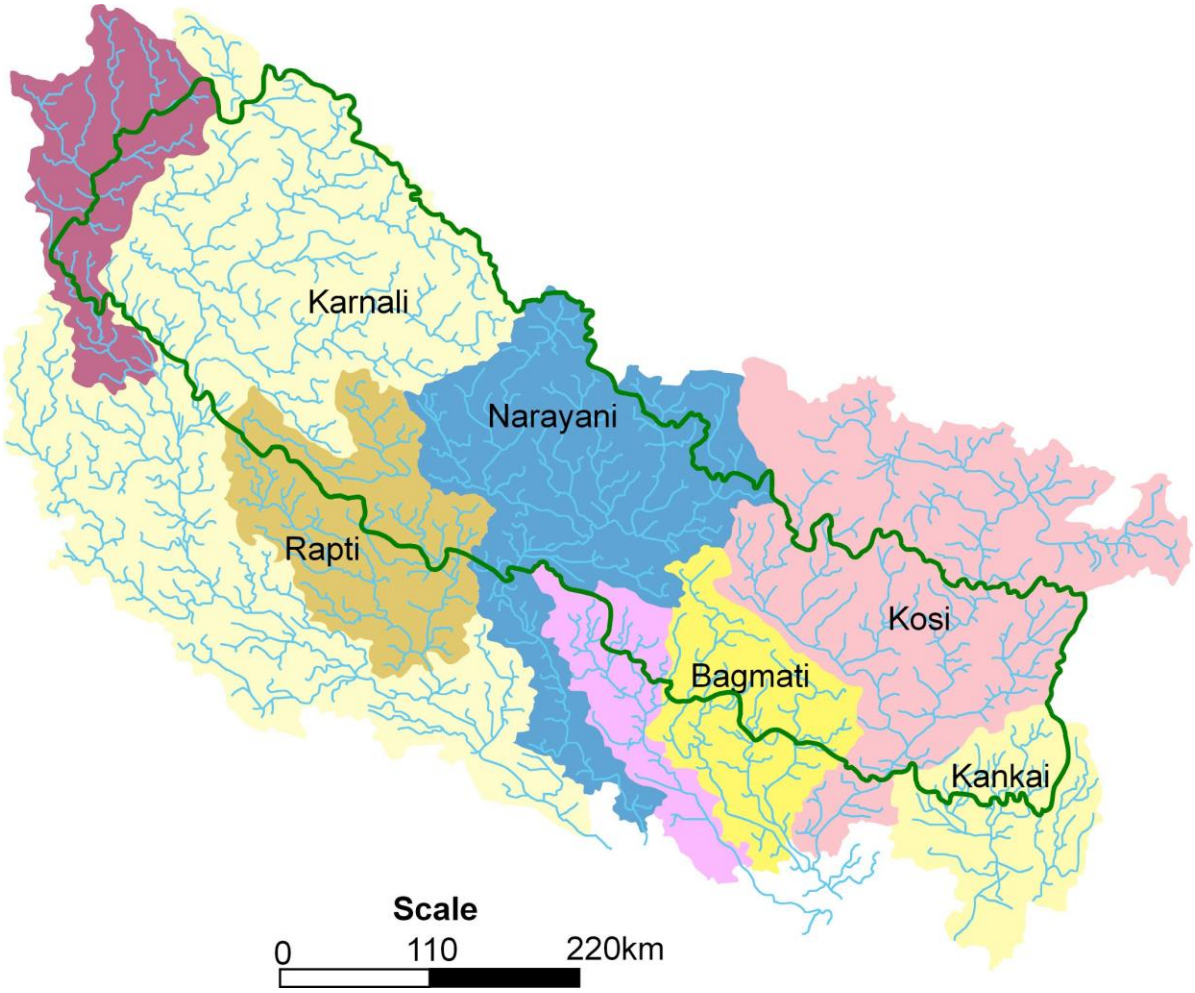


Fig. 5 : Major River Basins of Nepal

Section 2 - Development Context and Climate Risks

34. Located in geologically young and unstable rugged terrains in the Himalayas, Nepal's natural environment and ecosystems are diverse and vulnerable. These ecosystems are increasingly threatened by a rapidly growing population that is putting pressure on its fragile natural resource base including land, water, and forest resources. With resource-dependent human settlements relying heavily on these ecosystems for their livelihood, the deterioration of their environmental and natural resource base has contributed to chronic rural poverty and migration to urban areas, and heavy out migration to India and other countries. Uncontrolled urbanization and spreading infrastructure has contributed to reduced agriculture land, increasing congestion, and environmental degradation associated with the poorly managed disposal of solid and industrial wastes and other forms of pollution. Add to this an increased intensity and frequency of extreme weather events attributed to anthropogenic climate change, making the prospects for environmental sustainability and human security disconcerting.

35. An analysis of national temperatures since 1962 shows significant variations between years, but a progressive increase in maximum temperatures is evident in line with global and regional records. From 1977 to 1994, the mean annual temperature is estimated to have increased by 0.06°C annually, and is projected to increase by another 1.2°C by 2030, 1.7°C by 2050, and 3.0°C by 2100 (NAPA). Records show an increasing number of intense precipitation events, suggesting an increase in weather-related disasters such as floods and landslides, and associated human health impacts.

36. The expected impacts of climate change include water shortages in the dry season due to glacial retreat, and increasing threats from glacial lake outburst floods. On the other hand, erratic rainfall during monsoon poses the threat of increased landslides and erosion and reduced groundwater reserves due to excessive surface runoff. These impacts would have serious implications particularly with regards to hydropower development, water resources management, and agriculture. The impacts would be most felt by the poor who live on a subsistence basis. It would also affect Nepal's unique biodiversity upon which much of its tourism relies upon.

2.1. Climate

37. Nepal's climate is influenced by the Himalaya mountain range and the South Asian monsoon. The climate, predominantly influenced by the monsoons and westerly disturbance, is characterized by four distinct seasons: pre-monsoon (March-May), monsoon (June-September), post-monsoon (October-November) and winter (December-February).

Table 5: Climate Characteristics in Different Ecological Belts of Nepal

Physiographic zone	Ecological belt	Climate	Average annual precipitation	Mean annual temperature
High Himal	***High Mountain***	Arctic/alpine	Snow/150mm-200mm	$<3^0$C-10^0C
High mountain				
Middle mountain	***Middle Moutain***	Cool/warm	275mm-2300mm	10^0C-20^0C
Siwalik	***Churia/Terai***	Tropical/sub-tropical	1100mm-3000mm	20^0C-25^0C
Terai				

Source: WECS, 2005

38. The South Asian monsoon enters Nepal from southeast direction and precipitation start occurring as soon as it comes into contact with the ***Churia Range*** which is the first monsoon barrier. The monsoon rain is most abundant in the east and gradually declines as it moves westwards; while winter rains are higher in the northwest declining as it moves south-eastwards. The highest rainfall occurs in the central and mid hill areas (around Pokhara valley) and northeast and east of the Kathmandu Valley. Average annual rainfall is approximately 1800 mm. Temperatures tends to increase from north to south and with decreasing altitude. The winter season is coldest, with the highest temperatures during the pre-monsoon period.

2.2. Climate Variability and Change

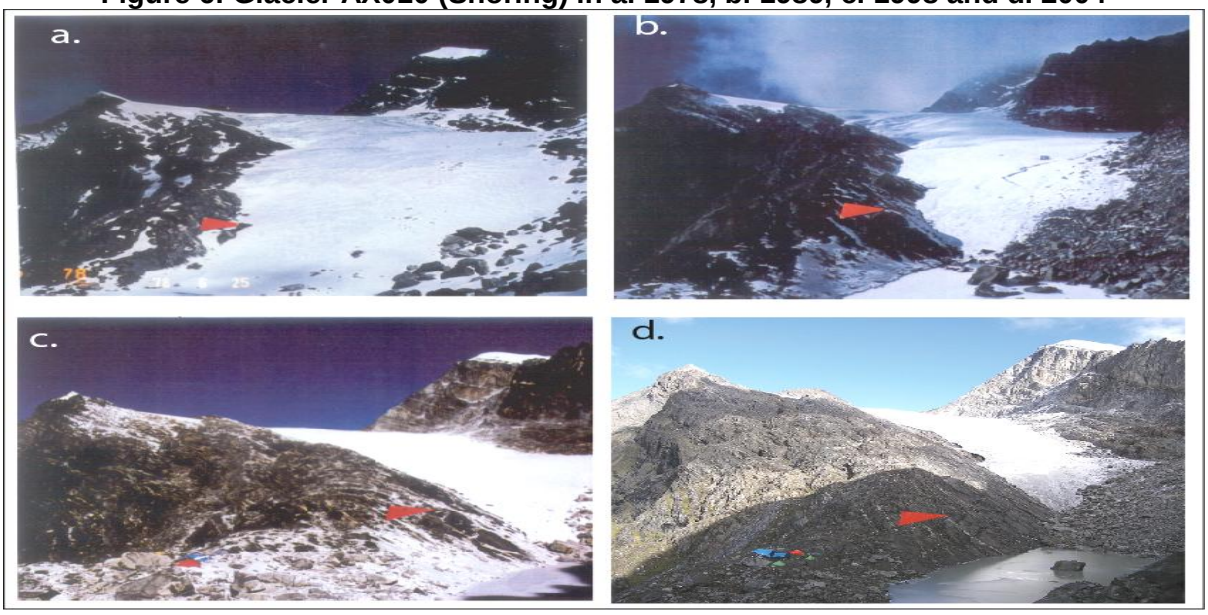
39. Observation data from current and the previous decades indicate consistent warming and rise in the maximum temperatures at an annual rate of 0.04-0.06^{o}C. Studies also indicate

that the observed warming trend is not uniform across the country. Warming has been shown to be more pronounced in high altitude regions and lower in the Churia-Terai range.

40. Annual precipitation data show a general decline in pre-monsoon precipitation in far- and mid-western Nepal, with a few pockets of declining rainfall in the western, central and eastern regions. In contrast, there is a general trend of increasing pre-monsoon precipitation in the rest of the country. Monsoon precipitation shows general declining trends in the mid-western and southern parts of western Nepal, with a few pockets of declining rainfall in the central and eastern regions. In the rest of the country, monsoon precipitation has generally increased. Post-monsoon precipitation shows increasing trends in most of the mid-western and the southern parts of eastern and central/western Nepal. A general declining precipitation trend is observed in most of the far-western and northern parts of the western, central and eastern Nepal. The winter precipitation trends show overall increasing trends except the northern part of mid-western, western and eastern Nepal.

41. Himalayan glacier melt and retreat have been well documented. Glacial lake outburst floods (GLOF) are being assessed through remote sensing and more recently by ground-truthing and satellite monitoring. Significant glacier retreat has been documented in recent decades, with a very high likelihood that this is linked to rising temperatures. Glacier AX010 in the Shorong Himal (see Figure 6) is one of the most studied glaciers in Nepal. The monitoring results since 1978 shows that the retreat from 1978 to 1989 was 30 m, which is equivalent to 12 m thinning of the glacier surface. Recently, Glacier AX010 was resurveyed and the glacier terminus has further retreated by 14 m after 1998.

Figure 6: Glacier AX010 (Shoring) in a. 1978, b. 1989, c. 1998 and d. 2004



Source: Glaciological Expedition in Nepal (GEN)

42. Recent studies of seven clean type glaciers in Khumbu Region for the 1970s to 1989 have documented that the majority of the glaciers have retreated in the range of 30 to 60 m in the observed period, while a subsequent expedition organized in 2004 found the majority of glaciers in Khumbu Region continuing to shrink at an even faster rate, while some smaller

glaciers have begun to disappear. Similar trends have been documented in studies of the Yala glacier terminus of Langtang Region, while a survey in the Ghunsa Khola basin of Kanchenjunga area and a comparison of the 1992 glaciers with those of 1958 in the area revealed that out of 57 glaciers, 50% of them have retreated from 1958 to 1992. The widespread glacial retreat in Nepal will have two direct consequences: (i) changes in the hydrological regime, and (ii) glacial lake outburst floods.

2.3. Climate Change Projections

43. *Temperature*: General Circulation Models run with the SRES B2 scenario show the mean annual temperature to increase by an average of 1.2^0C by 2030, 1.7^0C by 2050 and 3^0C by 2100 compared to a pre-2000 baseline. A recent study that used General and Regional Circulation Models projects the mean annual temperature to increase by 1.4^0C by 2030, 2.8^0C by 2060 and 4.7^0C by 2090. The projections show higher temperature increments during winter as compared to the monsoon seasons. Higher increments in temperature are projected over western and central Nepal as compared to eastern Nepal for the years 2030, 2060, and 2090, with projections for western Nepal being greatest. Similar trends are projected for the frequency of hot days and nights for 2060 and 2090.

44. *Precipitation*: Precipitation projections show no change in western and up to 5-10% increase in eastern Nepal for winter. During the summer months precipitation is projected to increase for the whole country in the range of 15 to 20%. A regional circulation model study projects both rise and decline in the mean annual precipitation with no clear trends. In terms of spatial distribution, this study projects an increase in monsoon rainfall in eastern and central Nepal as compared to western Nepal. Further, the projections indicate an ***increase in monsoon and post-monsoon rainfall as well as an increase in the intensity of rainfall, and a decrease in winter precipitation***.

45. The large inter-annual variation in rainfall could be attributed to natural cycles. IPCC (2007) projects that there will be a ***general increase in the intensity of heavy rainfall events in the future*** and an overall decrease by up to 15 days in the annual number of rainy days over a large part of South Asia. The observations and projections indicate that the ***key impacts are likely to include: significant warming, particularly at higher elevations, leading to reductions in snow and ice coverage; increased frequency of extreme events, including floods and droughts; and, overall increase in precipitation during the wet season with decreases in the mid hills.***

46. Although Nepal's share of CO^2 emissions is negligible in the global context, the country is regarded as a climate change hotspot due to its vulnerability to climate change impacts. Nepal is prone to many weather-related natural disasters, including floods, droughts, landslides and glacier lake outbursts with associated impacts on human health, livelihoods and property. In the recent history Nepal is experiencing more droughts and the incidents of floods, hailstorms, landslides and crop disease appear to be increasing (NPC, 2010).

2.4. Impacts on Water Resources

47. The INC of Nepal carried out a vulnerability and impact analysis of water resources with aspect to the changes in climate using water balance and deterministic models to the three (snow-fed) major river basins namely, the Karnali, the Narayani, and the Kosi and in one (rainfed) small Bagmati river basin. This particular study suggested that the hydrological

regime of the studied basins are more sensitive to changes in precipitation compared to temperature changes. A rather simplistic approach using altitudinal temperature lapse rate suggested that almost 20% of the present glaciated area above 5,000 meter altitude are likely to be snow- and glacier-free areas with an increase of air temperature by 1^oC. Similarly, 3^oC and 4^oC rise in temperature could result into a loss of 58% of snow, and 70% of glaciated areas. Climate change is anticipated to result in increased incidents of water scarcity in **High Mountain Region**, affect water quality and availability in the **Middle Mountains**, and cause increased incidents of water induced disaster (flooding, landslide, sedimentation, water-borne disease, vector-borne disease) problems in the **Churia/Terai** Region. Water scarcity is imminent in Nepal unless water resources are properly managed.

48. The Terai region and valleys of the Mid-Mountain region are heavily populated and intensively cultivated. Generally, populations that have been displaced due to weather-induced extreme events (floods, droughts) migrate to these valleys and Terai since these regions possess a huge amount of groundwater in addition to better infrastructure and economic prospects. This migration trend, along with haphazard urbanization, inadequate waste and pollution control, and unplanned increases in water use, has already resulted in reduced groundwater recharge and progressive depletion and degradation of groundwater resources. These impacts on water resources will progressively increase due to changes in the water cycle and water balance from climate change, ultimately affecting the availability of water for domestic and agricultural use. This situation has made several districts / communities more vulnerable for drinking water quality degradation and, in the long run, unavailability of water for any purposes.

2.5. Impacts on Agriculture and Food Security

49. Among all sectors in Nepal, ***agriculture*** is the most vulnerable to climate change impacts. Climate change is expected to impact agricultural productivity through three primary channels in Nepal: (i) increasing temperatures, (ii) climate variability and associated changes in the timing, intensity and volume of rainfall, and (iii) rising carbon dioxide levels. There is much uncertainty about the magnitude of these changes and the consequent effects on agriculture because of the extreme complexities of downscaling and projecting climate variables at high elevations and in monsoonal geographies. Nevertheless there is evidence that observed changes in temperatures and soil moisture that are already occurring and are adversely impacting agriculture in many parts of Nepal.

50. Floods increasingly take a heavy toll on the agricultural sector resulting in the loss of lives, destroying physical assets, displacing people, and inundating or depositing sediments on agricultural land. The Terai region, which is Nepal's prime agricultural area, is most at risk from flooding. Similarly, drought – both during winter and summer- is affecting agricultural crop production and the raising of livestock. The winter drought assessment confirmed that production of the major winter crops, wheat and barley, decreased nationally in 2009 by 14.5 and 17.3 percent respectively compared to previous years[14]. The 2008/2009 winter drought - one of the worst in the country's history - has destroyed crops across Nepal, with wheat and barley production reduced by 14 and 17 percent respectively. Crop yields in some districts in Mid- and Far-Western Nepal – which received less than 50 percent of average rainfall during

[14] Market Watch 14, 2009/WFP

the period from November 2008 to February 2009 - have dropped by more than half and placed more than two million people at high risk of food insecurity[15].

51. Agriculture in Nepal is basically subsistence oriented which makes up 35% of Nepal's GDP and absorbs 76% of the labor force. On average, households own 0.83 hectares of land (CBS 2004), but the majority (45%) owns less than 0.5 hectares. Only 31% of agricultural land is irrigated[16]. Even less irrigable land has access to water year round. As a result, agricultural production is highly dependable on favorable weather conditions, mainly on the monsoon's timing and sufficiency. A late or erratic monsoon quickly translates into crop losses and subsequent food insecurity. This reliance on water, which is likely to grow more scarce in the future due to variability in supply and growing demand, makes the agriculture sector one of the most vulnerable to climate change in the country. The current adaptive capacity of the agriculture sector Nepal is limited due to its present low productivity of the sector and the high incidence of poverty, particularly amongst the rural population[17].

52. Due to steep mountain slope, fragile soils, marginal farming systems and inadequate knowledge and technology for soil and water management/conservation, the erosion of fertile soils from agricultural land is significantly high which accelerates the process of already diminishing rate of agricultural productivity. Since water and agriculture are sensitive to climate change, any extent of change on climatic variables directly affects its performance. Climatic projections depict a change in air temperature, extent and periods of drought, and flooding due to increase in precipitation, agro-diversity and the productivity of food crops, soils, livestock and fisheries are likely to be negatively impacted. According to the TWG report on agriculture and food security, those elements of the agricultural sector operating under natural systems (i.e. rainfed) are likely to be in elevated state of distress compared to those under controlled environments (i.e. irrigated lands).

53. Increased temperature and rainfall variability have resulted into shifts in agro-ecological zones, prolonged dry spells, and higher incidences of pests and diseases. Studies also report that new alien and invasive species are emerging and their habitat is spreading at a fast rate. Extreme climatic conditions have led to increased incidence of fire in recent years affecting more than 50,000 people[18] and loss of large areas of productive forest land. These changes (amongst other drivers) lead to species and habitat loss (NAPA report).

54. Agricultural productivity in Nepal is one of the lowest in South Asia. If current production growth rates remain constant and demand for agricultural products continues to increase, it is likely that in the next 3-5 years Nepal will become consistently food deficit at the national level even in the times of 'normal harvest[19] .

[15] www.wfp.org/food-security/; posted on 31 May 2009/
[16] CBS 2002
[17] Climate Change and Agriculture Country Note – Nepal. This Country Note was produced by a World Bank team led by Animesh Shrivastava, comprising Cristina Dengel, Jitendra Srivastava, under SASDA Sector Manager Simeon Kacou Ehui.
[18] Centre for Research on the Epidemiology of Disaster (2008). Annual disaster statistical review: The numbers and trends 2007. http://www.preventionweb.net/files/2796_CREDAnnualStatisticalReview2007.pdf.
[19] WFP 2009 cited in , 2010 p 13/ The Food Security Atlas of Nepal, Food Security Monitoring Task Force

2.6. Forest and Biodiversity

55. Nepal possesses a disproportionately rich diversity of flora and fauna which are found in the dense tropical monsoon forests of the Terai, in the deciduous and coniferous forests of the subtropical and temperate regions, and in the sub-alpine and alpine pastures and snow-covered Himalayan peaks. Of the total number of mammal species, the Terai-Siwaliks region harbours the highest number of confined species (35 mammal species, 111 bird species, 46 Herpeto species, and 106 fish species). There are 399 endemic flowering plants in Nepal of which about 63% are from the High Mountains, 38% from the Mid Hills, and only 5% from the Terai and Siwaliks [20]. Nepal faces ongoing and emerging challenges in conserving biodiversity due to, *inter alia*, growing population, poverty, habitat loss, erosion of crop genetic diversity, and climate change which threaten the existing biodiversity but also the ecosystem services upon which the population of Nepal ultimately depend[21] to sustain their livelihoods and development.

56. Climate change threatens forest ecosystems and biodiversity in Nepal in a number of ways, including the increase in temperatures in lower altitudes, upward shifting of vegetation, encroachment of invasive species and thereby colonization, and increased prevalence of disease and pests. The prolonged winter dry spells has increased the incidence of forest fires have destroyed large forest areas and forest biomass, and hastening the emission of carbon dioxide into the atmosphere.

57. The upward shifting of ecological belts is expected with the rise in temperatures. However, upward movement of species will be limited due to adverse environment for their growth (e.g soil and moisture conditions) and hostile topography. Tree line shifting is expected to be slow because of the limited natural dispersal of seeds. Therefore, high altitude species, such as birch, *Jatamansi, Kutki, etc.* are likely to become more vulnerable with increase in climatic and human induced stresses. Habitats for mountain fauna such as the critically endangered snow leopard are increasingly threatened due to increased temperature. Reduced snowfall, untimely rains, and increased dryness have altered the flowering and fruiting behavior of plants, which is closely related to the survival of wildlife. When seasons of food availability change, the periodicity of life cycles (reproduction, migrations, and hibernation) of animals and insects are affected. Climate change is likely to reduce forest types of Nepal from 15 to 12, reduce the availability of forest products like herbs, and impact ecotourism.

58. Many observations suggest that recent climate change has already influenced animal and plant populations in a number of ways. The influence can be seen in the timing of seasonal events (e.g. flowering, migration), in rates of growth and reproduction, and in the distribution of species. Because species react differently to climate change, climate change is also influencing species interactions (e.g. predation, parasitism, competition, symbiosis). Lengthening of the growing season in colder region and shortening of the same in warmer part of the earth are some examples. This has resulted in the expansion and reduction of species habitat.

59. Global warming is likely to cause forest damage through migration of forests, change in their composition, and extinction of species. Tropical wet forest and warm temperate rain forest may disappear, and cool temperate vegetation may turn to warm temperate vegetation.

[20] Biodiversity Resource Book (2007) by ICIMOD and MoEST
[21] Biodiversity Resource Book (2007) by ICIMOD and MoEST

Climate change will not simply lead to a shifting of animal and plant communities as we know them today. Rather, new types of communities will develop. Species most likely to be at risk will be the species with low dispersal capacity (e.g. soil fauna, non-flying insects, tree species with heavy fruits).

2.7. Natural Hazards and Climate-Induced Disasters

60. Nepal is vulnerable tor various types of natural hazards such as earthquake, flood, landslide and debris flows due to steep topography, on-going mountain building process, highly fractured rocks, diverse climate and intense precipitation. Climate change is likely to increase the incidents of these events. The Risk Assessment undertaken during the SPCR planning process (see summary in Annex 1) clearly indicates that the incidents of flood, landslide, cold wave, heat wave, thunderstorm and hailstorm have constantly increased during the last few decades. The community consultation, during SPCR planning process, has identified that landslide and flood have significantly damaged physical infrastructures, washed away sources of drinking water, cultivated land and forest resources.

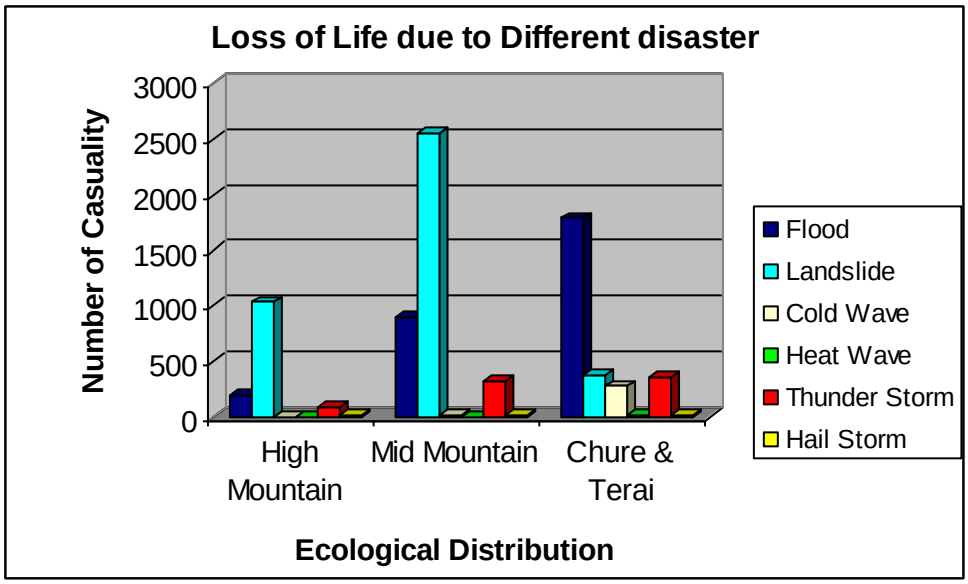


Figure 7: Loss of life due to different disasters in each ecological zone during 1971-2009 period.

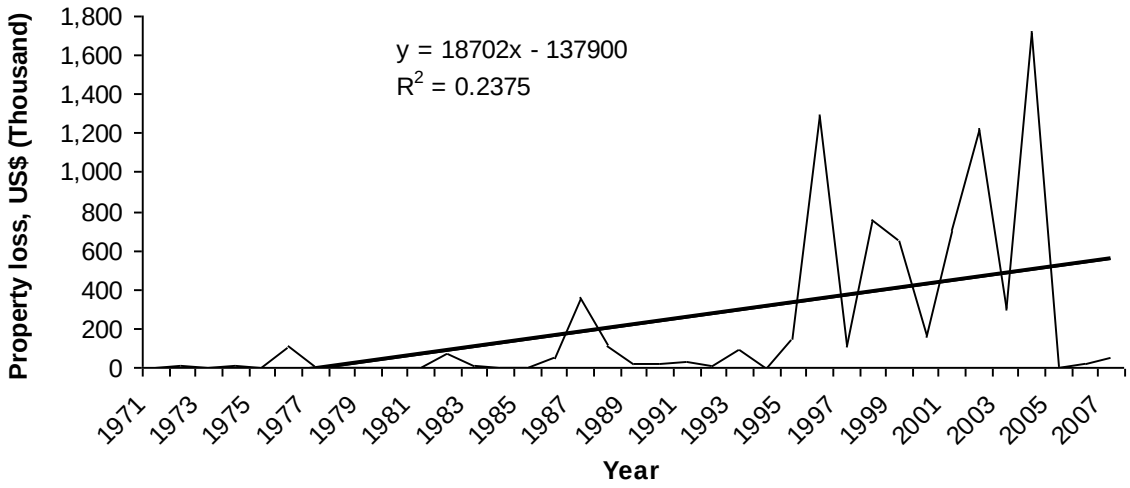


Fig. 8: Value of Property in US$ Destroyed by Landslide in Mid-Mountains during 1971-2007 period

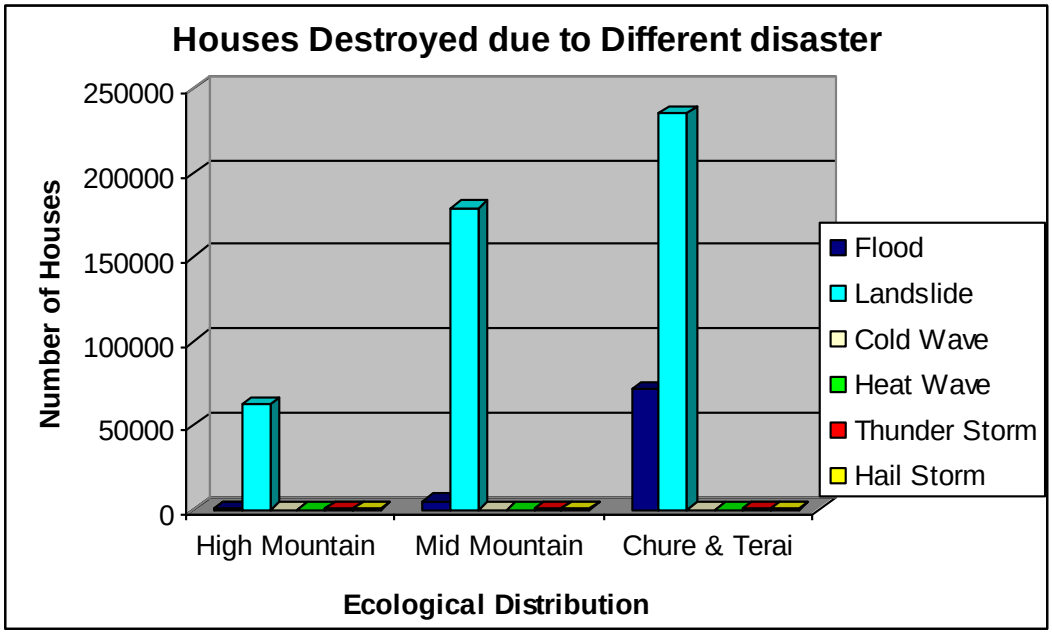


Fig 9: Homes destroyed due to different disasters during 1971-2007 period

2.8. Impacts on Health Sector

61. Growing risks of malaria, *Ka-lazar*, and Japanese encephalitis outbreak are the potential impacts of climate change on health. Subtropical and warm temperate regions of Nepal, in particular, would be more vulnerable to malaria and *Ka-laazar*. Increase in temperature would make the subtropical region of Nepal more susceptible to incidents of Japanese

encephalitis. Mosquitoes are now becoming ubiquitous in Nepal whereas historically they used to be confined to the Terai and Valley regions which are predominated by a tropical climate. The impact of waterborne and vector borne diseases – based on data collected by the Ministry of Health - is shown in Fig. 10.

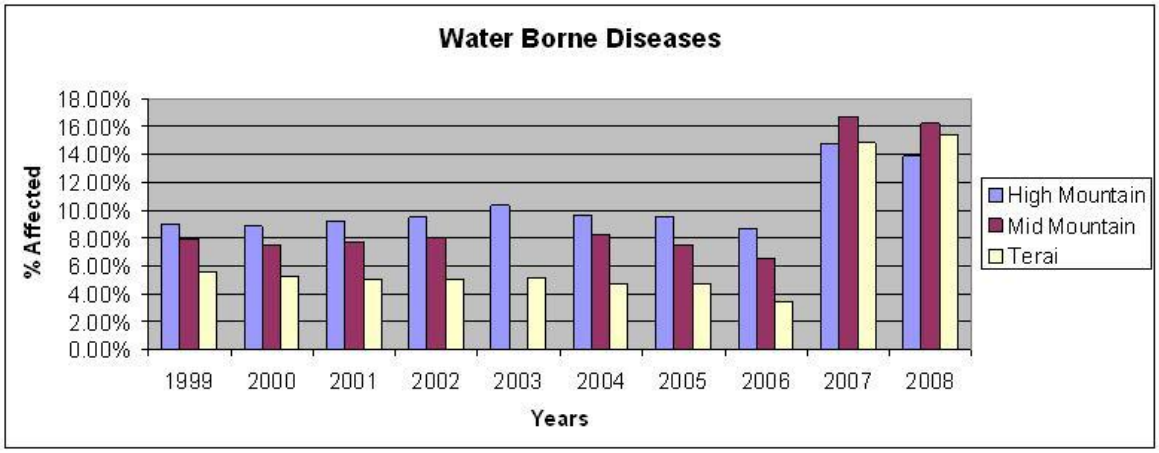


Fig. 10: Trend of water borne diseases in the three ecological zones

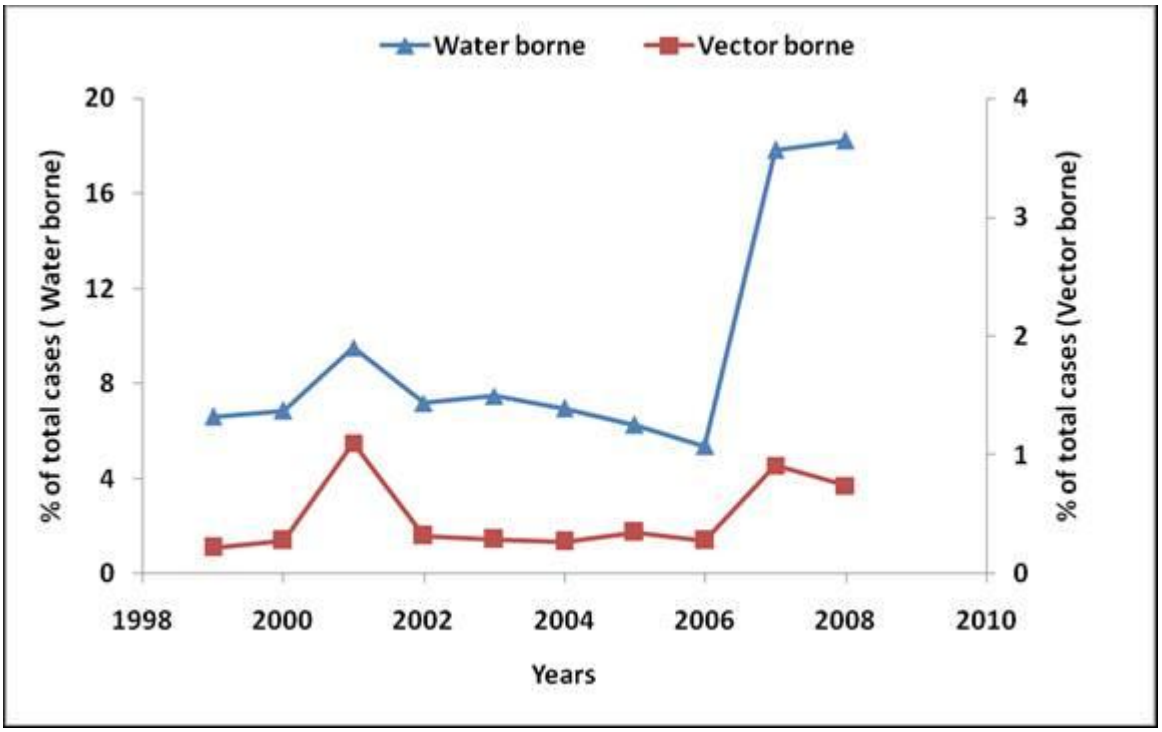


Figure 11: National trend of water borne and vector borne diseases during 1998-2008

2.9. Impacts on Livelihoods

62. Nepal is basically an agricultural country. About 80% of the people are dependent on agriculture for their income and employment. Agriculture and livestock farming is the most common livelihood for the majority of people living in rural areas, where people's livelihoods continue to be threatened due to impacts of climate change on crops production and livestock-raising. Climate change will weaken the livelihoods of poor people by eroding their livelihood assets. Poor people are vulnerable to the loss of physical capital (damage to shelter and infrastructure), human capital (malnutrition and diseases), social capital (displacement of communities), natural capital (loss/degradation or water, and loss of productivity in agriculture and fisheries) and financial capital (more disasters and lower income). Degradation of livelihoods by climate change will thus leave poor people with less of the assets they need to withstand shocks and stresses. The number of houses destroyed during the 1971-2009 period – based on district data collected during this period by the Ministry of Home Affairs - is shown in Fig. 9. Degradation of livelihoods by climate change will thus leave poor people with less of the assets they need to withstand shocks and stresses.

2.10. Impacts on Urban Settlements and Infrastructures

63. The urban population in 2001 was 3.3 million and projections indicated that it is likely to double in a decade. The urban population in 2010 has been estimated to be more than 7 million - 20 % of Nepal's population in 2010. The three previous census (1981, 1991 and 2001) depicted a significant growth in administrative units or municipalities (23, 33 and 58 respectively). Current level of infrastructure and public services available in the cities or towns are not only inadequate but also not uniformly available. Urban floods, dispersion of pollutants to water bodies and outbreaks of water and vector borne diseases are increasingly visible in the urban areas. Similarly, disruption to transport services due to flood or landslide damage to road or drainage structures, damage to water intakes and buildings are the major outcome risks linked to the unusual weather patterns and rise in climate related extreme events. the results of the *Risk Assessment* undertaken during SPCR planning highlights the fact that outcome risks associated with such events will vary in each physiographic unit - as outline in Annex1

2.11. Climate Change and Gender

64. Knowledge related to climate change and gender in Nepal is an emerging area of study. Although event and outcome risks of climate change apply equally to all human beings, they have a disproportionate impact on men and women. One reason for this is comparatively weak adaptive capacity amongst women in light of their disproportionate access to resources and opportunities (less paid for equal work, less access to education, less access to health services, less social and political power) which increases their vulnerability compared to men[22]. Women's daily activities, particularly in rural areas, are largely associated with natural resources such as fetching water, collecting firewood and grasses, working on agricultural lands, and they are more prone to carrying an extra burden/drudgery due to declining natural resources and environmental services. All these leads to differential gender (women, single women and women headed households) impacts of climate change.

[22] **Case Study: Gender and Climate Change in the Hindu Kush Himalayas of Nepal, ICIMOD Unpublished report**

65. In many climate induced natural disasters, more women than men lose their lives as they happen to work in disaster prone areas, have inadequate knowledge of disaster and coping mechanisms and get have less access to basic services, food and other resources within their house and society. In some cases, casualties occur when women attempt to collect household possessions in times of disasters and, in other cases women have lost their life during flood events as they could not swim due to their heavy/difficult clothing.

66. Change in precipitation and temperature patterns affect the availability of fuel wood, fodder, grasses and drinking water – typically considered as women's responsibility- who will likely take more time to collect such resources, thereby adding to women's daily drudgery and affecting their health and causing emotional stress. This is very prevalent in high and mid mountain regions. Women in the Terai region generally suffer from poor access to social capital and financial resources. They receive less or second priority in access to food, drinking water, medication and other basic services. Mainly in mid-mountain and Churia-Terai regions, climate induced disasters force more and more people, mostly male, to relocate or move from the community, leaving women with additional burden to manage their house, elderly, the sick, and young while continuing farming operations needed to sustain the family.

2.12. Spatial Distribution of Risks and Vulnerability

67. The compilation of disaster related data during 1971-2009 - based on district data collected during this period by the Ministry of Home Affairs - analysed during SPCR planning is presented in Figures 12-15 below and Annex 1 showing spatial distribution.

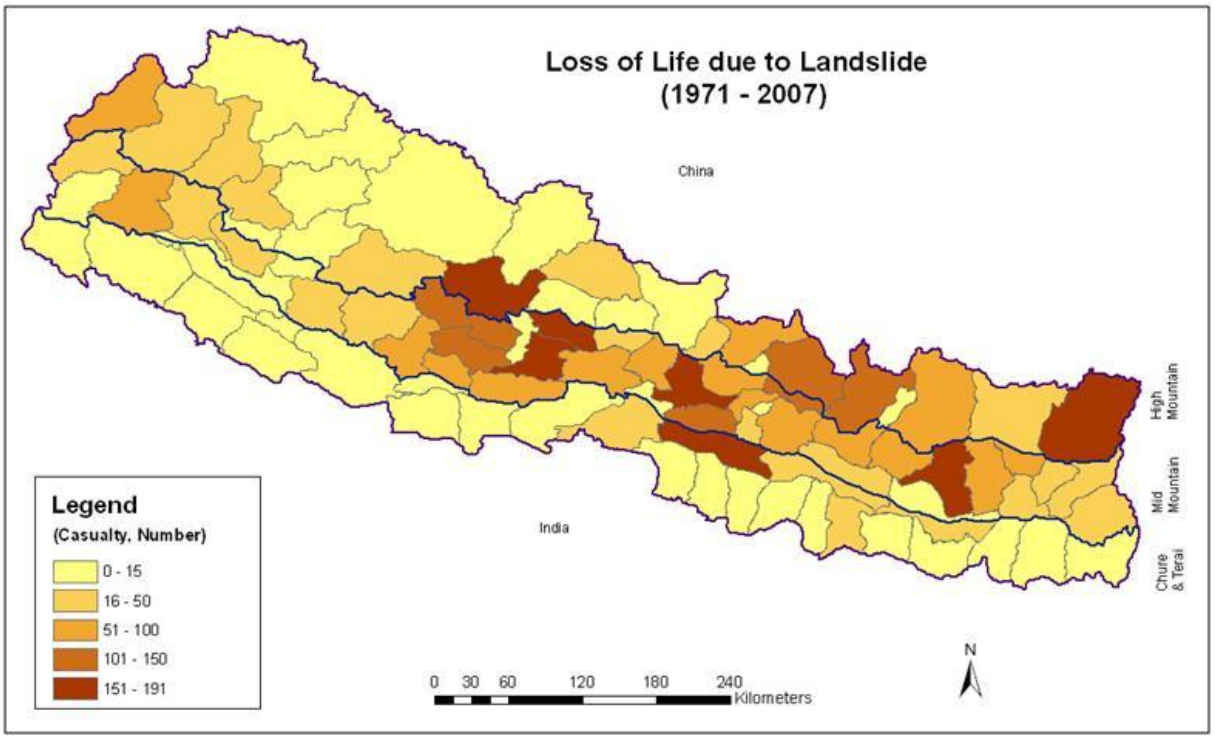


Fig. 12 : Loss of Life due to Landslide

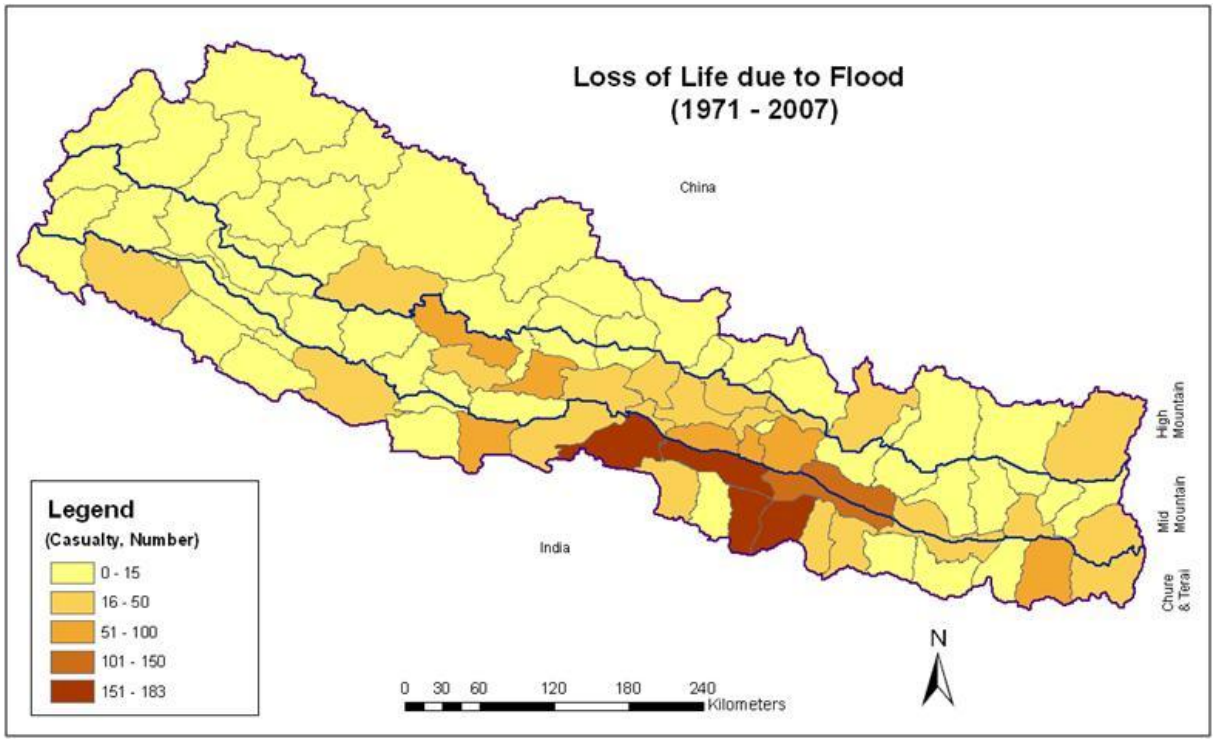


Fig. 13 : Loss of Life due to Flood

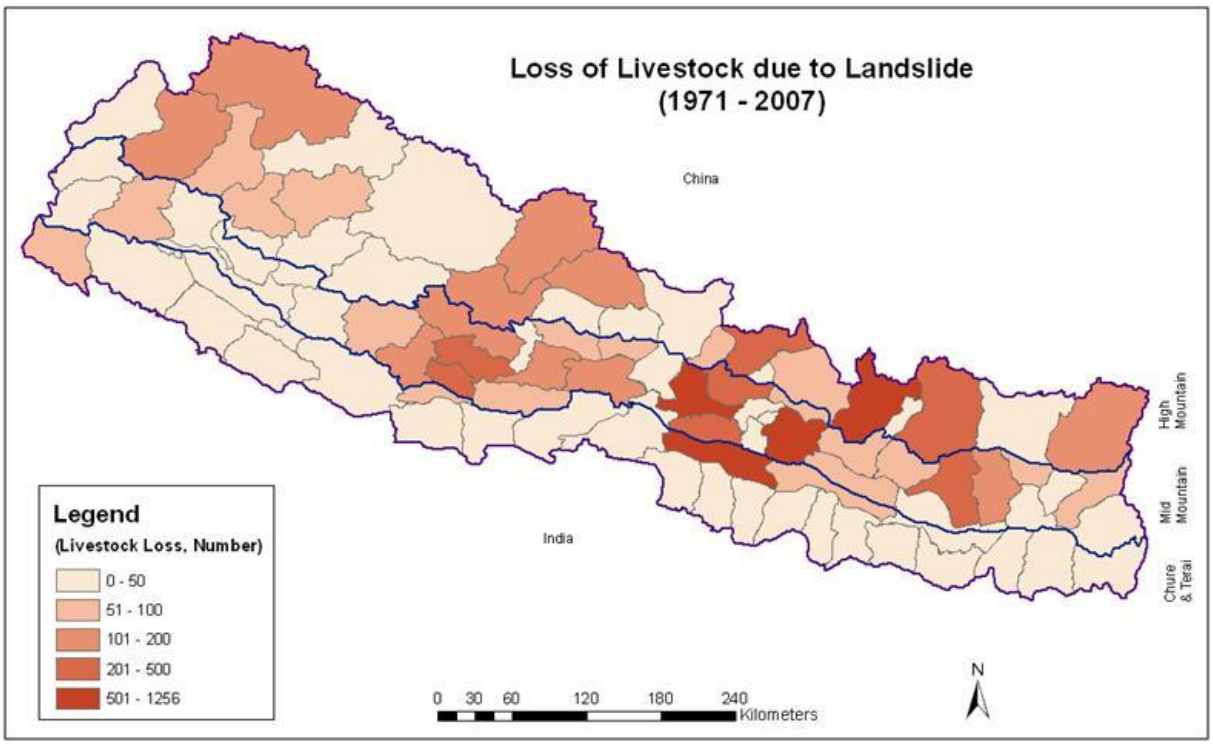


Fig. 14 : Loss of Livestock due to Landslide

2.13. Adaptive Capacity

68. Adaptive capacity in Nepal, like many developing countries, is affected by external pressures such as terms of trade, impacts of globalisation (both positive and negative), financial crises, international conflicts, rising external debt, and internal local conditions such as rapid population growth, rising incidence of poverty, political instability, unemployment, reduced social cohesion, and a widening gap between poor and rich, together with the interactions between them.

69. An *Adaptive Capacity Assessment* was undertaken during SPCR planning to identify capacity gaps and needs at the national, sectoral, district and community levels. Determining adaptive capacity is not a precise science and will vary from country to country and be determined by mechanisms that are available to respond to the nature of the climate change vulnerability at the present stage of development in a country. The adaptive capacity assessment undertaken during SPCR planning attempted to identify and quantify adaptive capacity at the following levels:
    - within vulnerable communities and households;
    - within vulnerable sectors (e.g. water, health, agriculture);
    - within key agencies/organisations (public and within civil society including local government/municipalities).

70. A focus group consultation and household survey and questionnaire (see Annex 2 B) were used, in part, to undertake the Adaptive Capacity Assessment. Key issues to be determined when these adaptive capacity assessment were undertaken include:
    - knowledge (including indigenous knowledge) and awareness of climate change risks;
    - awareness of appropriate mechanisms (including indigenous coping mechanisms) to address climate change risks;
    - ability to implement appropriate climate change risk management mechanisms as measured ***by access to resources*** (human, technical, financial, social capital, government or social support, natural resources, etc.) and ***ability to deploy such resources***;
    - ability to implement climate change risk monitoring and continuous improvement measures.

2.14. Synthesis of Adaptive Capacity Assessment (Sectoral, District/Community Level)

71. The SPCR TA team's process used four key climate change risk management indicators; (a) knowledge, (b) mechanisms, (c) resources and (d) impediments to assess adaptive capacity at national, district and community levels.

72. Knowledge is inadequate to address climate change risks and therefore the planning of development projects follows a "business as usual" path. There exists moderate knowledge on climate change risk at the senior level in some ministries and departments, but very little exists at junior levels in key government agencies and at the district and local levels. Most public officials are unfamiliar with tools such as climate proofing, screening etc. Technical training to government officials at the district level and community levels and financial resources to implement climate change risk management measures is needed.

73. Overlapping mandates among different district agencies, inadequate coordination, meager fund flows and weak resource allocation mechanisms are major impediments to effective climate change risks management. Existing policies and legal frameworks do not bar action, but need to be strengthened to address climate change risks. Knowledge on climate change risk is better in districts that have disaster management plans. There are a few non-governmental organizations (NGOs) and community-based organizations (CBOs) involved in disaster risk reduction (DRR) but they largely lack trained staff. Both government and NGOs/CBOs need additional training and financial resources to implement climate change risk management and disaster risk reduction measures. Lack of elected peoples' representatives in disaster management committees and inadequate funds are identified as additional impediments to climate proofing planning and implementing projects. Other impediments include lack of emergency shelters in flood plains, absence of micro-insurance and micro-finance, and a lack of connectivity. A summary of the Sectoral/District/Community Adaptive Capacity Assessment is provided in Annex 6

2.15. National Adaptive Capacity Assessment

74. Different indicators were used to conduct national level adaptive capacity assessment. The indicators were arranged in a questionnaire form which was circulated among TWG coordinators and members, government officers and professionals (see Annex 7). Key deficiencies include: (a) the almost complete absence of climate change risk management personnel in key organizations and institutions; (b) climate change risk management is not institutionalized in government, academia, civil society or in vulnerable sectors, municipalities, districts or communities; (c) no training, database, information or guidance exists on planning/constructing climate resilient development; (d) there are insufficient financial resources to effectively integrate climate change risk management into development planning; (e) development planning in key sectors (water, agriculture, physical planning) does not consider risks associated with climate change and there are no modalities to facilitate such transformational change in development planning. The results of the assessment, presented in Annex 7.

Section 3 - Overview and Linkage to Existing Development Plans and Programs

75. Following the Second People's Movement of April 2006 and the signing of a comprehensive peace agreement in November 2006 that ended a decade-long armed conflict, Nepal entered into a new era of political change. Preparations are currently under way to write a new constitution. For the first time, the Interim Constitution of Nepal (2007) has recognised the "right to a clean environment" as a fundamental right of the citizens of Nepal.

76. Nepal's primary goal is to reduce poverty, which the government is pursuing through a strategy of economic development, good governance, and an inclusive development process, with an emphasis on devolution of responsibility to district and local governments. Nepal's development goals, and therefore Nepal`s *Strategic Framework for Climate Resilience,* are set under the overriding goal of reducing poverty in the country by improving social capital and economic development. Poverty in Nepal is characterized as largely rural in nature with a 14% difference between rural and urban poverty. In 2009, urban and rural poverty levels were 8 and 22% respectively. Poverty occurrence also

varies in spatial terms; in 2009, it was 37.4% in the Mid-Western region while it was 1.9% in Kathmandu.

77. A series of National Five-Year Plans and Three-Year Interim Plans have been formulated aimed at achieving poverty reduction by providing a policy framework that encourages investments in primary sectors that form the backbone of rural development and poverty reduction. Similarly, the overarching aims of the Tenth Five-Year Plan/Poverty Reduction Strategy Paper (2002-2007) and the interim Three-Year Plans (2007-2010 and 2010-2012) are to bring about 'a remarkable and sustained reduction in the poverty level in Nepal``. In order to do so the plans identify four broad development priorities: broad-based sustained growth; improvement in access and quality of infrastructure, social and economic services in the rural areas; targeted programmes for social and economic inclusion of the poor and marginalized communities; and good governance to improve service delivery, efficiency, transparency and accountability.

78. The current Three-Year Plan (2010-2012) also aims at reducing poverty through sustainable economic growth and improving the living standard of the people. Similar to the interventions of the Tenth Plan, it aims at creating employment, reducing economic and regional disparity, and eliminating social exclusion. It accords priority to the agricultural sector and promises policy and budgetary support to ensure implementation of the plan. Previous National Plans addressed different dimensions of sustainable economic growth and concerns regarding the importance of climate change. For instance, the need to internalize environmental impact assessment (EIA) into development planning was articulated in 1980s and in 1993, *Nepal Environmental Policy and Action Plan* (NEPAP) was prepared to facilitate integration of environmental considerations into the development process. Similarly, the *Local Self-Governance Act* (1999) provides local governments with a mandate to carry out a number of environment and development related activities.

79. The Government of Nepal (GoN) has recently issued the Three Year Plan (TYP) Approach Paper *(2010-2012))* which has broad-based objectives of, *inter alia*, promoting green development, making development activities climate-friendly, mitigating the adverse impacts of climate change, and promoting adaptation. The TYP also has objectives of mitigating urban pollution and protecting rural natural beauty. The key expected outcomes of the TYP are to prepare and implement a national framework on climate change adaptation and mitigation, disaster risk reduction, poverty reduction and poverty environment initiatives. The TYP has adopted the following strategies: (i) strengthen the institutional capacity related to environmental policies and regulations; (ii) internalize environment management into the development efforts; (iii) prioritize and plan for effective implementation of national and international environmental commitments; (iv) adapt to climate change and manage natural resources sustainably; (v) make meteorological forecast more reliable; and (vi) conduct study and research on environmental promotion and climate change.

80. Nepal started the *National Capacity Self Assessment* (NCSA) Project development process in early 2002, and because of the fluid political situation, it took almost 4 years to complete. The objectives of NCSA were
    (i) to identify, confirm, or review priority issues for action within the thematic areas of biodiversity, climate change, and desertification and land degradation;

(ii) to explore related capacity needs within and across the three thematic areas;
(iii) to catalyze targeted and coordinated action and requests for future external funding and assistance; and
(iv) to link country action to the broader national environmental management and sustainable development framework.

The overall goal of NCSA was to catalyze national action to implementing the Convention on Biodiversity (CBD), United Nations Convention to Combat Desertification (UNCCD), and United Nations Framework Convention on Climate Change (UNFCCC) through an integrated and sustainable program of capacity development. Strategically, NCSA was developed as a program of broad national stakeholder consultations to critically discuss the underlying root capacity deficiencies and opportunities to meet national and global environmental objectives. In addition to focusing on the three Rio conventions, NCSA also pays particular attention to those capacity constraints and opportunities that cut across the three conventions, as well as the synergies that can be created by jointly implementing multilateral environmental agreements. The NCSA [23] highlights: (a) ***the absence of observation stations to collect key meteorological data (spatial and temporal) needed for the establishment of early warning systems; and (b) the low level of funding for climate change risk management measures, as priority constraints that limit effective implementation of urgently needed adaptation measures*** under the UNFCCC.

81. The Government of Nepal has prepared its *National Adaptation Programme of Action* (NAPA) through a broad-based consultative process. The total cost to implement urgent and immediate adaptation measures in the NAPA is estimated to be approximately USD 350 million. The prioritized adaptation options include both urgent/immediate and long term adaptation strategies in key vulnerable sectors under the six TWGs. More focus has been given to providing information, knowledge, skills and technology to the most vulnerable households living in fragile and climate vulnerable districts across Nepal. The strategies and actions were targeted to increase community's adaptive capacity through livelihoods support, improved governance, collective responses, improved service delivery mechanisms, and access to technology and finance. The NAPA has also promoted a watershed and landscape level approach dealing with issues related to food security, biodiversity loss, water scarcity, energy use, settlements, disease outbreak, and governance. The draft NAPA report was reviewed through a public consultation process. This has been finalized and approved by the Government of Nepal on 28th September 2010.

82. A summary of sectoral policies, plans and strategies and climate change related activities is included as Annex 4.

83. Climate change risks are noted by Nepal 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 received some priority, but further attention to climate change risks needs to be brought into the development process together with disaster risk reduction.

[23] *Nepal: National Capacity Self-Assessment Report and Action Plan..* Ministry of Environment, Science and Technology. 2009.

84. Climate change is relatively new to Nepal, and as such, studies are limited, with some research and development and adaptation works being carried out in the country. A summary of climate change related activities is provided in Annex 4.

85. The international donor community has been working with Nepal to fill gaps in financing, knowledge, and capacities on climate change adaptation. These projects and programmes have already brought together a critical mass of experience to undertake initial vulnerability assessments and early planning for adaptation to climate change. However, it is ***now imperative that national capacities be strengthened to support the broad integration of climate change risk management into development planning***.

86. A summary of ongoing climate change adaptation projects being supported by developments partners is provided in Annex 5.

Section 4 - Institutional Analysis

87. After participating in the United Nations Conference on Environment and Development (UNCED) held in Rio de Janeiro (Brazil) in June 1992, Nepal responded immediately by establishing the Environment Protection Council (EPC). Under the chairmanship of the Prime Minister, EPC's objective is to integrate environmental concerns into the development process. EPC initiated the process of formulating the national policy on environment and approved the *Nepal Environmental Policy and Action Plan* in 1994.

88. In September 1995, the Government of Nepal realized the need to have a separate ministry in the field of environmental management, and established the Ministry of Population and Environment (MoPE). In the same year the umbrella act on environment management (*Environment Protection Act*) was enacted. In April 1996, the Government established the Ministry of Science and Technology to facilitate the process of scientific and technological development in a coordinated way. In November 1996, the Government established the Alternative Energy Promotion Centre (AEPC) under the Ministry of Science and Technology to support the government in formulating, promoting, extending, developing, and disseminating alternative and renewable energy technology policies.

89. The Government of Nepal realized the importance of integrating environment, science, and technology-related works in a more coordinated way, and merged the Environment Division of MoPE and established the Ministry of Environment, Science and Technology (MoEST). From the climate change perspective, this merger was seen as a positive step towards broadening the scope of environment ministry particularly with the Department of Hydrology and Meteorology and the Alternative Energy Promotion Centre coming under its umbrella. Although MoEST primarily coordinates different government, semi-government, private, academia, and NGOs to achieve the objective of sustainable development, other key institutions are supporting or will be supporting the ministry in addressing the national and global environmental challenges, including the challenge of global warming.

90. In the policy and legislative front, several initiatives have been made, including bringing Sustainable Development Agenda for Nepal (SDAN) in 2003 to guide the sustainable development path until 2017. Many sectoral policies, strategies, plans and legislations to facilitate the implementation of SDAN targets have been made. All these initiatives are

reviewed in separate headings including the projects and programs initiated for national capacity building.

91. The Government of Nepal constituted the Climate Change Council under the chairmanship of Right Honourable Prime Minister on 23 July 2009. The Council, a high-level coordinating body, has been established, amongst other responsibilities, to:
    - Provide coordination, guidance and direction for the formulation and implementation of climate change-related policies;
    - Provide guidance for the integration of climate change-related aspects in long-term policies, perspective plans and programmes;
    - Take necessary measures to make climate change a national development agenda;
    - Initiate and coordinate activities related to additional financial and technical support to climate change-related programme and projects; and
    - Initiate and coordinate measures to achieve additional benefits from climate change-related international negotiations and decisions.

    The Composition of the Council is summarized in Annex 6.

92. As of 30 August 2010, the Council has met five times, during which it agreed on the need to establish the Climate Change Management Division in the Ministry of Environment, and decided to lunch the Mountain Alliance Initiatives (MAI) as a platform to ensure that mountain issues and concerns get due attention in the international deliberations, in particular the climate negotiations. The Ministry of Environment functions as the Secretariat of the Council. The Ministry has established the Council Secretariat Section under the Climate Change Management Division to implement activities related to the Council.

93. The current Three-Year Plan (2010-2012) and the *Sustainable Development Agenda of Nepal* (SDAN) outline an implementation approach that made the Ministry of Environment (MoE) responsible for coordinating all activities related to environment conservation and climate change. The government formed the Multi-Stakeholder Climate Change Initiatives Coordination Committee (MCCICC) in April 2010 under the chairmanship of the Secretary of MoE. The Committee aims to foster a unified and coordinated climate change response in Nepal. It institutionalizes the multi-stakeholder and participatory process adopted in the formulation of the *National Adaptation Programme of Action* (NAPA) and Nepal's *Strategic program for Climate Resilience (SPCR)*, consolidates the strengths of the six multi-sectoral thematic working groups utilised to formulate the NAPA and the SPCR, facilitates the engagement of the local-level institutions with national institutions as exercised during the vulnerability analysis under the NAPA and the Risk Assessments and Adaptive Capacity Assessments undertaken to develop the SPCR, and builds on the *Donor Compact on Climate Change* which was signed between the Government of Nepal and 14 development partners on 2 September 2009. As a coordination body at the functional level, the Multi-Stakeholder Climate Change Initiatives Coordination Committee (MCCICC) reports to the Climate Change Council and contributes to mainstreaming the climate change programmes into development planning and implementation. The functions of the Committee are outlined in Annex 4.

94. The recently established Climate Change Management Division at MoE serves as the Secretariat of the Committee, which meets at least once in every quarter. Being the focal

ministry for climate change and environmental issues, the MoE is responsible for overall coordination between adaptation policy and on-the-ground implementation and amongst stakeholders and partners. On behalf of all projects, it will be responsible for reporting and liaising with the Climate Change Council – the apex body responsible for policy coordination – and the MCCICC – a coordination mechanism established within MoE to ensure functional coordination at the national level.

95. The Ministry of Environment works through various line agencies and organisations at the municipal, district and community levels to deliver climate change programs. A summary of other key institutions that have a role in managing climate change risks in Nepal is presented in Annex 6.

96. Nepal's *Initial National Communication* to the UNFCCC (2004) and *National Capacity Self-Assessment* (2008) highlighted key problems in relation to implementing adaptation activities including inadequate financial, technological and human resources. Additionally, the Adaptive Capacity Assessment undertaken during SPCR preparation has identified a number of key gaps in national capacity. In summary, the following have been identified:
    1. Government of Nepal does not have any specific national policy on climate change - however, the Ministry of Environment has recently initiated a process to formulate such a policy;
    2. Sectoral policies and plans such as on water resources, agriculture, energy and industry formulated even after the adoption of the SDAN do not specifically address risks associated with climate change;
    3. TYIP and the various sectoral policies, plans and strategies do not recognize the likely impacts of climate change as risks that could affect the successful delivery of such policies, plans and strategies;
    4. The Government of Nepal has created a number of institutions as advisory bodies, policy making bodies (ministries), implementing departments and centers, research institutions, and training institutions with specific roles and responsibilities. The lack of institutional capacity for climate change risk management and poor coordination amongst the concerned agencies is the main reason why climate change risks management is not formally integrated into development planning at the national, sectoral, district, and village levels.
    5. The lack of or inadequate institutional capacity and real-time monitoring infrastructure within the Department of Hydrology and Meteorology (DHM) has resulted in very limited observation data on the meteorological and hydrological parameters to support early warning systems and the identification of appropriate adaptation measures at the community level.
    6. A sustainable and predictable source of financing for climate change risk management is the most pressing challenge for building capacity at the national, district and local levels, and within civil society.

97. The following key messages and observations concerning capacity to manage climate change risks were obtained from the district and community level consultations undertaken during the SPCR planning process:
    1. Multi-use emergency shelters are needed in landslide and flood prone areas;
    2. Micro-financing / soft loan / micro-insurance are needed to address losses from flooding. crop failure, and damage to houses and infrastructure;

3. A systematic approach to water resource management is urgently needed to enhance the resilience of water resources and address high priority risks from climate change;
4. The current level of waste and pollution management infrastructure and public services provided at the urban areas are either inadequate or limited both in quantitative and qualitative terms leading to haphazard dumping of waste, water pollution and urban flood. Since climate change impacts will aggravate these current challenges, urgent attention is needed in the sector.
5. Climate change risk management and the role of communities and civil society in managing climate change risks are not clearly articulated or well understood by central government, with central government, civil society and vulnerable communities possessing little capacity for climate change risks management;
6. An integrated ecosystem (water-agriculture-forest) approach is needed in light of the inter-connectedness of Nepal's natural resources and human reliance on such resources for social/economic development and the need to promote a more strategic and holistic approach to resilience building that will address climate change risks;
7. Improved capacity for climate change risk management is an urgent priority - particularly for infrastructure development (guidelines to construct local road, and extract sand & gravel from river bed, location of buildings/structures in flood-prone areas);
8. Improved connectivity (small road, bridge, culvert, boat) is required to enhance the resilience of remote communities to provide immediate access to safe sites/hospitals/ schools/food security;
9. Early warning systems are required to facilitate community response to climate change risks - community based disaster preparedness plans have been developed but there are insufficient resources to implement these plans, and in most cases, they are not linked to real-time early warning systems;
10. Increased social conflict and forced migration due to water resources drying/declining is becoming a pressing problem in many remote communities;
11. Promoting livelihood diversification is needed to enhance resilience in vulnerable communities.

Section 5. Rational for PPCR Support

98.. Nepal produces only 0.025% of global greenhouse emissions (*Initial National Communication to the Conference of the Parties of the United Nations Framework Convention on Climate Change.* 2004), but is disproportionally at risk from climate change impacts. Nepal along with Bolivia were selected to receive support under the PPCR[24] as an example of a country in a ***Mountain Region*** which is vulnerable to climate change impacts associated with snow and ice melt, water supply, ecological zone and other consequences. Priority risks include the melting of Himalayan glaciers associated with increased flood risk in the short term, and with a loss of water resources, principally in the dry season, in the medium to long term (by around 2035). The IPCC indicates that major rivers could become seasonal as a result of the loss of glacial melt, affecting dry season resources for millions of people. Additionally, changes in the strength and behaviour of the Asian monsoon may be associated with a range of impacts, including increasing flood

[24] *The Selection of Countries to Participate in the Pilot Program for Climate Resilience (PPPCR): Report of the Expert Group to the Subcommittee of the PPCR.* CIF. January 2009.

risks in the summer months. However, monsoons are potentially highly sensitive to global change, and there is a strong possibility of collapse, increased variability, and/or changes in the geographical range of the Asian monsoon. The above hazards mean that Nepal is exposed to a complex web of potential climate change impacts, including elevated disaster risk, the loss of productive land and water resources, and possible abrupt changes in climate. Nepal was selected given the potentially serious implications associated with rapid glacial melt that confronts the country's development agenda. With further screening using *Adaptive Capacity* criteria, Nepal was also selected over other candidate countries on the basis that Nepal is more vulnerable. The PPCR program in Nepal has the opportunity to ***demonstrate viable interventions to address climate change risks associated with Mountain Regions with low adaptive capacity***.

99. In order to help Nepal transform to a climate resilient development path, consistent with poverty reduction, food security and sustainable development goals, the ***SPCR builds upon government's ongoing programs to address poverty and support's the country's long-term vision to achieve a climate resilient development by:***
    (a) building climate resilient water resources and communities; and
    (b) establishing a comprehensive program of capacity building for climate change risk management at the systematic, institutional and individual levels, at the national, sectoral, district and local level, and within the public sector and civil society that will support the integration of climate change risk management into development planning.

100. The *Risk Assessment* undertaken during the SPCR Planning Process has confirmed that water quantity and quality are priority climate change risks facing Nepal, followed by food security, human health impacts and impacts on ecological resilience. The *Adaptive Capacity Assessment* undertaken has identified ***considerable limitations in climate change risk management capacity*** at the systematic, institutional and individual levels, at the national, sectoral, district and local level, and within the public sector and civil society, highlighting the need for considerable capacity building. The *Adaptive Capacity Assessment* confirmed the need for improved levels of earmarked financial resources for climate change risk management and resiliency building as highlighted in the NCSA, and the need for building the capacities of key state and non state actors in climate change risk management.

101. The *Resilience Assessment* identified the need for SPCR interventions that:
    (a) ***will be implemented within vulnerable communities/sectors that address existing vulnerability to climate extremes*** (e.g. floods, droughts, etc.) ***and climate variability*** and associated impacts (e.g. outbreaks of vector and water-borne disease);
    (b) ***will enhance resilience*** at the national level, within vulnerable ecosystems, sectors and communities, or within key agencies and organisations (public and civil society);
    (c) ***will have a positive impact on social capital, the quality of basic services, and natural resources that provide essential environmental services***.

102. Nepal's development goals, and therefore Nepal`s *Strategic Framework for Climate Resilience,* are set under the overriding goal of reducing poverty in the country by improving social capital and economic development. Nepal`s SPCR interventions focus on

demonstrating a "***Mountain ecosystem approach to building resilience in vulnerable communities***", thereby providing lessons on how best to approach building climate resilience in vulnerable Mountain Regions, while recognising the inter-connectivity of the different mountain regions and their ecosystems. Though the available surface water of Nepal (202 km^3) could fulfill the demand of the country up to the end of 21st century, the availability of only 26 km^3 water in dry season shows that ***water scarcity is imminent in Nepal unless water resources are properly managed.*** The vision and approach adopted by Nepal in its *Strategic Framework for Climate Resilience* (see Figure 16) focuses on addressing three key elements necessary to build resilient communities, namely:

a. ***Enhancing the resilience of natural water systems*** which are the resources essential for sustained social and economic development;
b. ***Enhancing the resilience of vulnerable communities*** by improving social capital;
c. ***Strengthening capacity for climate change risk management*** that will be necessary to facilitate transformational change needed for to integrate climate change risk into development planning.

103. A key goal of Nepal's SPCR is to provide lessons through learning-by-doing over the next few years that ***demonstrate modalities for building climate resilience in water resource management and community development planning which can be replicated in other river systems and vulnerable communities***. Additionally, Nepal's SPCR interventions will ***support a comprehensive program of capacity building for climate change risk management at the systematic, institutional and individual levels, at the national, sectoral, district and local level, and within the public sector and civil society that will support the integration of climate change risk management into development planning***. In so doing, SPCR interventions will support the establishment of ***an appropriate institutional architecture that will support a long term, sustainable mainstreaming of climate resilience into national development policy and planning.***

Figure 15: Vision for Nepal's SPCR

104. Without SPCR intervention, the Government of Nepal will not have the resources (human, technical, financial) to build and integrate climate resilience into national water resource management and community development planning, nor build the national capacity for climate change risk management, due to the following reasons:
    - Nepal is a low income country that is experiencing difficulties in mobilizing sufficient national capital to address poverty alleviation and basic development needs, let alone the incremental costs associated with building climate resilience into national development planning;
    - Even though community development planning activities receive high national priority and concurrent levels of financing from the national budget, the competing demands on the national budget – which has been affected from the impacts of the global economic downturn - means that the Government cannot afford to finance the high incremental costs associated with integrating climate change risk management into

infrastructure planning and design, water resource management or community development;

- The absence of skilled personnel who can integrate climate change risks and resilience considerations into development activities is a key impediment, and without SPCR intervention it is unlikely that Nepal will be able to develop this pool of expertise in a timely manner so as to support transformational change in development planning;
- In the absence of an understanding of the benefits of or the mechanisms for achieving such development, neither guidelines nor incentives exist to promote climate resilient development, and accordingly access to capital is not readily available for developers in Nepal to build climate resilient development;
- Limited in-country knowledge on how to integrate climate change risk and resilience into regular development activities, such as water resource management, agriculture, public health, hydropower, infrastructure or community development.

105. The traditional "business as usual" approach to development planning in Nepal is not designed to cope with current climatic change risks. National efforts to build climate resiliency suffers from ***a lack of high quality standardized data*** to inform early warning systems and ***insufficient technical capabilities*** to apply appropriate climate change risk management tools. Moreover, at present, most climate change adaptation measures that are being implemented by the government with support from development partners focus on ***short term (urgent and immediate) measures and do establish, in a comprehensive and systematic manner, long-term strategic framework focused on overall climate resilience***. In light of Nepal's resource (human, technical, financial) constraints, without SPCR intervention it is unlikely that the country could systematically undertake the transformational change required to build climate resiliency into development planning.

106. Nepal recognises that ***development relies upon the sound and sustainable management of water resources***, but other pressing development priorities prevent the Government from establishing holistic and strategic water resource management programs with consequent impact on the country's water quality and long-term availability.

107. Through ***an integrated water resource and ecosystem-based approach focusing on community-based management*** that combines management of mountain regions and water resources, social protection through micro-finance/insurance against climate risks, and the establishment of early warning systems, the SPCR will support, strengthen, and facilitate the scaling up of interventions that will build long-term climate resilience in Nepal. In a country where the impacts to water resources constitutes the principal climate change risk and the majority of the population derives considerable benefit and livelihood from such resources, SPCR support is ***a critical entry point*** to improve the resilience of water resources and associated mountain ecosystems.

108. SPCR interventions will be sustained in the long-term by establishing ***effective partnerships*** with all stakeholders (public sector and civil society, technical and financial partners, local governments, vulnerable communities, grass-roots organizations) to build ***climate resilience in water resource management and community development***

planning which will be replicated in other river systems and vulnerable communities.

109. Nepal`s *Strategic Framework for Climate Resilience* will make a significant contribution to sustainable development in Nepal, and adds value by ensuring that these component activities are not stand alone activities***, but are integrated into community, sectoral and national development policies and programs.***

110. Nepal is requesting US$110 million in support to implement the SPCR, comprising US$50 million in grants and US$60 million in loans.

Potential cost effectiveness of proposed actions - Insert outcomes of economic analysis.

Section 6 - Outline of Nepal`s Strategic Program for Climate Resilience
To be finalised

Section 7 - Participation Process

111. The SPCR planning process that led to the development of Nepal`s Strategic Program involved extensive consultations with over 850 individuals (see Annex 2) – (400 at the national and sectoral level, and 450 at district and community levels) – representing a wide range of interests (public, private, NGO, womens` groups, farmers, district and village development officers, academia). Framing the main climate risks, impacts and resilience building options was based on a socially inclusive, broad based consultative process within the country. This ensured that PPCR supported actions will build on local experiences and reflect the views and needs of a range of stakeholders, including specifically vulnerable groups and sectors (such as small farmers, women, youth, indigenous peoples and local communities, and other vulnerable groups).

112. The process to develop Nepal`s ***Strategic Program for Climate Resilience*** was designed with the following objectives:
    - ensure compliance with PPCR Guidelines;
    - build upon the extensive stakeholder stocktaking and analysis undertaken under the NAPA, the National Capacity Self Assessment (NCSA), the preparation of Nepal's Second National Communication (SNC) to the *United Nations Framework Convention on Climate Change (UNFCCC),* and other national strategies and programs;
    - address gaps in the preparation of the NAPA which has been developed in accordance with the *Guidelines for the Preparation of National Adaptation Programmes of Action* (UNFCCC 28/CP.7.); and
    - ensure that the SPCR builds resilience within Nepal while addressing the risks of vulnerable communities and sectors.

113. In developing Nepal`s ***Strategic Program for Climate Resilience*** the following activities were undertaken to address gaps in the NAPA process while ensuring compliance with PPCR Guidelines:
    - *Assessment of Climate Change Risk* to estimate, evaluate and rank climate change risks affecting individual vulnerable communities and sectors;

- *Adaptive Capacity Assessment* focussing on vulnerable communities and sectors;
- *Definition of Priority Action Needs/Investments;*
- *Resilience Assessment* to ensure that proposed investment promote and enhance resilience within vulnerable communities/sectors and at the national level;
- *Cost/Benefit Analysis* of proposed priority measures to demonstrate overall economic benefit of such measures;
- *Design of Implementation Modalities* to ensure the sound, transparent and timely management of PPCR programs and funds.

114. The SPCR Planning process was designed to ensure that PPCR investments, as a priority, address current exposure to climate extremes/variability within vulnerable communities, with SPCR investments directed towards on-the-ground measures to assist these vulnerable communities.

115. A summary of the meetings and stakeholders consulted is provided in Annex 2A, Annex 2 B contains the Household Questionnaire that was used by the SPCR team to evaluate adaptive capacity at the household level.

Annex 4
PPCR Joint Mission Aide Memoire 15 – 21 November 2010

Component 1 - Building Climate Resilience of Watersheds and Water Resources in Mountain Eco-Regions

Rationale/Climate Risks Addressed

1. In 2010, the community of Dhe in Nepal's Upper Mustang mountain district migrated due to lack of drinking water. Communities consulted in the preparation of the SPCR confirmed that they are at risk from availability, reliability, and degradation of freshwater resources and their watersheds. SPCR interventions need to address critical watershed and water resource vulnerability issues relating to climate change impacts, such as water scarcity in High Mountain Region, water quality and/or deficiency, landslide/mass wasting, accelerated soil erosion, biodiversity loss in the Middle Mountains, and water induced disasters (flooding, landslide, sedimentation, water-borne disease, vector-borne disease) in the Churia/Terai Region. This SPCR component addresses the integrated management of watershed and land ecosystems so that communities in the high, middle, and Churia mountain regions have sustainable watershed and water resources for their domestic and agricultural needs.

2. Mountains are referred to as "water towers" as they provide a large part of the water used by people. The Nepal Himalaya provides a crucial ecosystem service by retaining the snow and ice in glaciers and high altitude wetlands and providing the base flows to the rivers. However, water in particular for domestic uses (drinking water) is locally tapped from springs and small streams. The sustainability of the water supply of water in local communities depends on the watershed condition and forest cover. Also, while river water is abundant in Nepal, the availability of water is not uniformly distributed in time and space. As the hydrology is primarily monsoon-driven, around 85% of rainfall falls during the four monsoon months of June-September. Within recent years the onset of monsoon and its reliability has been disrupted. The temporal variability of rainfall and runoff is hence very high. During the monsoon, there is plenty of water almost everywhere. During the dry season, water availability for different uses is critical, especially in the High and Middle Mountains.

3. Watershed management is fundamental to ensuring the integrity of the water cycle. It is well documented that well-managed forest enhances water recharge. The Government has promoted community's-managed forests through an ecosystem approach to improve water availability. The need for ecosystem management is clearly articulated in the Water Resources Strategy (2002) and National Water Plan (2005). Watershed management, through improved forest and land cover to protect water source areas and water conservation practices, can help to maintain soil moisture, protect the water sources and support rainwater harvesting. It can also improve infiltration so that groundwater percolation can be increased to help aquifer recharge. Natural water sources need to be conserved through managing forests and wetlands, preferably indigenous broad-leaved plants, and water saving and conservation measures put in place.

4. With climate change, however, watershed management alone may not be enough to ensure adequate, reliable water supplies throughout the year. There is a need to ensure water retention from the monsoon into the dry season for domestic and agriculture uses. Almost all the irrigation is through diversion of water from rich water-flow streams or perennial springs which during dry season can create water scarcity problems. As there is plenty of water during monsoon, investing in smaller, distributed storage infrastructure which could then be used during the dry season would help in increasing the agricultural production and ensuring reliability of drinking water in the mountains. Storage development is also important for the mitigation of floods. Indigenous hills systems where a catchment area at the top of a slope is kept under

natural vegetation to serve as a water source, and ponds are dug within the catchment area to harvest water for irrigation and livestock can be promoted.

5. Using the watershed as unit of analysis, and taking an ecosystem approach to land and water management, the water balance of sub-catchments or watersheds must be examined to determine whether there is a need for enhanced watershed management investments and/or investments in water storage. The right mix of these investments will be determined by the specific characteristics of each ecosystem and the communities that live there.

6. Currently, water resources investments are designed and implemented according to administrative (district and village) boundaries rather than watershed boundaries. The Government of Nepal has emphasized integrated water resources management (IWRM), particularly through the National Water Plan (2005) and the preparation of an IWRM policy (draft under consultation). Nepal has seen recent success in multi-use water resources planning covering drinking water supply and sanitation, irrigation, and small hydropower, for example, the current efforts by local government to prepare water use master plans and the various bilateral-supported comprehensive water projects. However, these are still according to administrative boundaries and within the traditional water withdrawal rights. In order to effectively manage the projected impacts of climate change and climate variability on the country's water resources, planning and management should be according to geographical/topographical boundaries and consider the current and projected water balance for a river catchment basin. The competing needs of various water users should be looked at in a comprehensive and integrated fashion based on the water balance. Although the National Water Plan calls for IWRM on a basin-wide scale, water resource management is still undertaken on a fragmented basis, with responsibility shared amongst a number of agencies. A number of efforts are underway to move toward IWRM (see paragraphs 8-10). IWRM on a basin scale takes considerable time, as an institutional and regulatory framework should be put in place for river basin administration to manage the competing demands by water users. It is proposed that the SPCR complement Nepal's IWRM initiatives by moving toward planning according to geographic boundaries, but on a sub-catchment or watershed scale.

7. In light of climate change, a range of natural and artificial storage options must be considered for piloting and scaling up. DSCWM, ICIMOD and IWMI, among others, have conducted some research on potential water storage options, such as artificial conservation ponds and tanks, small and large reservoirs, groundwater recharge systems, bunds, and temporary runoff and rainwater collection areas. Good practice is to consider storage and increase in supply in a comprehensive manner, looking at surface and ground water as well as enhancing natural water body, managing natural water infrastructure (forest) and creating artificial storage. Due regard must also be given to the environmental, cultural and economic feasibility of different options.

8. Improving water productivity is the other way to reduce the demand /supply gap. For irrigation, there is a need to reduce conveyance losses, distribution losses (inadequate operation), improve irrigation efficiency at the field level and enhance agricultural production (improve farmers agricultural practices, diversification, reduction of post harvest losses) Since irrigated agriculture is the biggest draw on accessible freshwater, there is a need to examine irrigation efficiencies to determine if Nepal's programs result in "more crop and value per drop". According to IWMI, "without further improvements in water productivity or major shifts in production patterns, the amount of water lost through evapotranspiration in agriculture will increase by 70-90% by 2050." The Government's current programs improve the reliability of irrigation during

the monsoon season by replacing or building diversion infrastructures, improve canal system conveyance efficiency through canal improvements and branch canal division structures, and implementing an agricultural training program for improved on-farm irrigation application, crop production increases and crop diversification. However, specific system efficiencies have not been measured in Nepal. In light of the expected increased unreliability of freshwater resources, it is important to know how effective irrigation improvement programs are and how efficiencies can be better enhanced (if needed).

9. Addressing the availability of water in mountain ecosystems can help Nepal meet its social inclusion goals. The burden of carrying water usually falls to women and children, so addressing their multi-use water availability needs and increasing their access to water resources will help in addressing gender issues. Moreover, this SPCR component will target areas with high out-migration, where a high percentage of female-headed households live also taking into consideration the forests and watershed condition.

Complementary with Ongoing and Planned Initiatives

10. The Government and ADB are discussing plans to conduct a country water assessment looking at (i) the current water balance sheet in most of the river basins; (ii) projection of the supply/demand gap over the next 20 years under different growth scenarios; and (iii) reform elements required to meet the demand gap and to strengthen the water sector's national and river basin development planning capacity. The final output of this assessment will likely be an updated/amended version of the National Water Plan.

11. The World Bank is supporting the Government to develop a water resources GIS database. This will produce atlases for each major basin and overall for Nepal integrating key information on the climate, terrain, land use, hydrology, and administrative, socio-economic, environmental, public health, irrigation, agriculture aspects and trends. These atlases will illustrate key issues, documenting the system from a multi-disciplinary perspective and conveying the history, status and future possible vision. It will also produce an assessment of land and water resources to support preparation of a river basin model. The International Water Management Institute (IWMI) is also finalizing its findings from basin-wide water balance calculations for the Koshi basin in Nepal and Tibet.

12. The Government has recently joined the Network of Asian River Basin Organizations, and a technical assistance (TA) project is underway to build the capacity of key government agencies in IWRM. Building on an action plan developed for the Bagmati river basin (comprising Kathmandu valley), the TA will conduct a water balance and water use inventory, seek to develop the legal and institutional framework for river administration, and facilitate prioritization of investment projects to improve water security in the Bagmati basin. ADB's 2011-2013 business plan includes a 2011 project preparatory TA and a 2013 Bagmati Improvement Project.

13. The Government has prepared the Biodiversity Strategy (2002) and its Implementation Plan (2006) in addition to country-wide expansion of users-managed forests. The forestry sector policy equally emphasises on ecosystem and watershed management. Management of the Ramsar wetland sites including the wetlands within and outside the protected areas is given high priority by the National Wetland Policy 2003 (?).

Expected Project/Component Development Outcome

14. Communities in Nepal's vulnerable ecosystems have improved access to and improved reliability of watershed and water resources.

Criteria for Location Selection

15. Component activities will be implemented in key priority watersheds in each mountain ecological zone of Nepal (i.e. *High Mountain*, *Middle Mountain*, and *Churia Hills*)***.*** A detailed evaluation and final decision concerning the watersheds for assessment and investment will be conducted during the project preparation phase[1]. Watersheds that provide upstream and downstream linkages within a given river basin will be given special attention.

Project/Component Outputs and Activities

Output 1: Communities who have already developed watershed management plans implement quick actions to build resilience.

In areas where watershed management plans have been developed under the leadership of DSCWM, implementation of key actions in those plans will be implemented as platforms for learning. The management plans will first be assessed and improved for addressing climate resilience. Appropriate water resources protection and management interventions will be implemented (the same slate of possible activities listed under Output 2). Observations and lessons learned through these quick implementation actions will be used in development and/or improvement of Output 2.

Output 2: Communities and ecosystems in selected mountain watersheds (identified as significantly vulnerable to water scarcity due to climate change) have improved physical and economic resilience to changes in availability of water for domestic, agricultural, and environmental use.

Possible activities may include:

(i) A review of current watershed management options, source protection, storage types and perform a gap analysis of effectiveness and suitability for Nepal's diverse watersheds, and an assessment of surface water irrigation system efficiencies resulting in preparation and implementation by DoI and DOLIDAR of a plan to improve system efficiencies[2].

(ii) For priority watersheds and through a 6-month participatory process, conduct an assessment of water balance and prepare a specific plan for watershed management, source protection, multi-use systems (MUS), rain-water harvesting/storage investments, water conservation and land use planning and management changes

(iii) Identify interventions for watershed and water resource protection (such as degraded land rehabilitation, land productivity conservation, natural water-induced disaster prevention, protection of development infrastructure from erosion / sedimentation) and water storage interventions, especially through community-based user groups and public-private partnership

(iv) Promote livelihood improvement activities such as promoting high value and traditional crops, and perennial high value Non Timber Forest Products (NTFPs), and the introduction of value-added activities to improve value chain of agricultural

[1] The number of watersheds that could be covered under the project/component would partly depend on the amount of financial resources allocated to the project/component and the cost estimates of various source protection and water storage civil works.

[2] This plan would be implemented in the context of the Government's existing irrigation development program.

production and for sustained use and promotion in water source protection areas and other income generation activities
(v) Promote micro-enterprise development as co-benefits of water source protection, and development of self-financing for water management
(vi) Provide technical assistance to prepare feasibility assessment and provide environmental education and raising awareness for the interventions communities selected
(vii) Measure impact on community and ecosystem resilience to climate change.

Types of possible watershed management interventions:

(i) Source protection -- Wetland conservation or regeneration of forests, agroforestry and afforestation, soil moisture retention measures
(ii) Watershed Management – Degraded land rehabilitation, land productivity conservation, protection of development infrastructure from erosion/sedimentation, wetland protection and conservation
(iii) Water Conservation – Conservation farming and on-farm conservation, water conservation (i.e. drip and sprinkle irrigation and traditional crops and climate resilient seeds)
(iv) Surface and Subsurface Water storage – Groundwater recharge, multi-use systems (MUS), conservation ponds and tanks, soil moisture retention, reservoirs, conservation ponds and tanks for rainwater harvesting, spring/stream storage, snow meltwater and runoff collection systems
(v) Livelihoods Improvement – high value and traditional crops, perennial high value non-timber forest products promotion, value-added activities to improve value chain of agricultural production and income generation activities promotion to ensure effective watershed management programs
(vi) Biodiversity conservation - habitat monitoring, environmental education and raising awareness, action plans that integrate climate change risk management (Included in Component 3), micro-insurance for vulnerable communities (Included in Component 2)

Explanatory Notes:

1. **Scale of Project/Component coverage:**

It is anticipated that project/component outcome would apply to all mountain ecosystems in Nepal, but the watershed and water resource management plans and investments described in Output 2 would be implemented in as many watersheds as possible with the available financing, possibly 10-12 watersheds covering different representative mountain ecosystems.

2. **Private Sector Involvement in Technology Development and Implementation:**

Private sector stakeholders will be involved in assessing feasible options to address water reliability challenges, in order that private sector businesses can develop and provide/supply water saving technologies broadly throughout Nepal. Private sector through microfinance institutions (MFIs) may provide access to finance to micro-enterprise and cooperatives for activities that support livelihood and watershed and water resources management.

3. **NGO Involvement:**

Building on mission consultations held, the Government and MDBs will continue to consult NGOs on the design of this SPCR component. For project implementation, it is envisaged that technical assistance packages will be needed for project management and engineering, and for assisting communities in implementing project-related activities. As NGOs have a

comparative advantage in working at the grassroots level, an NGO or consortium of NGOs could be engaged (through competitive selection) for implementation, especially to assist communities in developing watershed management plans, raising awareness and in implementing livelihood activities.

Indicative Budget: Approximately $45 million with a combination of grant and credit

Lead Agency: Ministry of Forests and Soil Conservation (MoFSC)

Possible Relevant Stakeholders:

Government: MoFSC/DSCWM, MoI/DoI, MoAC/DoA, MLD/DOLIDAR, MPPW/DWSS, WECS, DDCs and VDCs

Non-Government: NGOs and civil society organizations, private sector, agricultural banks, community forestry groups, networks of water users.

Component 2: Building Resilience to Climate-Related Extreme Events

Rationale/Climate Risks Addressed

1. Nepal faces substantial threat from climate change and climate variability including increased incidents of extreme events and associated climate induced disasters. Nepal is highly vulnerable to droughts and floods that not only devastate lives and livelihoods, but also undermine progress on economic growth and poverty alleviation. This is expected to be exacerbated further under climate change. The Intergovernmental Panel on Climate Change's (IPCC) Fourth Assessment Report indicated that Nepal is expected to have increased flooding caused by changes in hydrology and glacier melt in the Himalayas, leading to decrease in crop yields and rising mortality. In addition, the IPCC also stresses the existence of a "white spot", which indicates "no data" is available in the region for climate models.

2. During the Risk Assessment undertaken during SPCR preparation, extreme high precipitation, increase in temperature, extreme low precipitation/drought, and increased climatic variability were identified as climate change event risks faced by all regions in Nepal. The Adaptive Capacity Assessment highlighted the urgent need to establish community-based early warning systems to help vulnerable communities respond to climate-induced disasters, and implement actions required to provide advance warning *before* disaster strikes with an early warning flood and drought system and *after* disaster strikes by providing innovative financial instruments such as micro-insurance / finance to help cope with climate-related losses.

3. Warning of an impending (flash) flood or drought is critical to help vulnerable communities respond safely and effectively to a climate-induced disaster. While the Department of Hydrology and Meteorology (DHM) currently maintains nation-wide networks of precipitation, hydrometric, sediment, climatic, agro-meteorological, synoptic and aero-synoptic stations, limited real-time flood and drought information exist and currently do not reach vulnerable communities. Considering the extreme topographic characteristics and dense network of streams, the network of meteorological and hydrological stations needs to be improved and strengthened in both network density and data quality. The development of hydro-meteorological monitoring systems in Nepal has occurred in a piecemeal fashion, with arguably limited attention paid to the overall network design, as well as to problems associated with operating the network under conditions of limited staff and computing resources. Once the appropriate systems are in place, the private sector (e.g., telecommunications) can take a lead in disseminating the available data (e.g. flood and drought) to communities as the basis for early warning systems. Subsequently the same platform may be used for agriculture-based early warning systems.

4. After an adverse climate-induced event, the vast majority of farmers are exposed to large climate variability and often do not have the financial safety net necessary to absorb adverse shocks. Given that the agricultural sector employs approximately 74% of Nepal population, contributes approximately 34% of Nepal's GDP and plays a major role in economic growth and poverty alleviation, innovative financial products to assist farmers in addressing shocks and risks associated with climate-induced disasters are urgently needed. The *Adaptive Capacity Assessment* undertaken during SPCR preparation has highlighted the urgent need for micro-insurance / finance by farming communities, home owners and women to address critical vulnerability to climate change impacts by these

populations groups. Institutionally, farmers currently lack awareness and access to agricultural insurance and there is a lack of legal and regulatory framework for agricultural insurance. In addition, Insurance companies have limited financial, technical and operational capacity to develop the necessary financial products.

Project Development Objective

5. Build resilience in vulnerable communities by establishing early warning systems and improving access to financial instruments that reduce the adverse impacts of climate induced shocks.

Project/Component Outputs

6. Subcomponent 1: Install real-time hydro-meteorological infrastructure and information nation-wide and establish early warning systems for priority vulnerable communities

   (a) Design of real-time hydro-meteorological observation network based on country studies and needs assessment;
   (b) Procure and install real-time hydro-meteorological monitoring equipment (e.g. rain gauges, snow pillows/gauges, water level gauges, discharge measurement equipment, mid-atmosphere weather radars for country-wide 3-day forecasting, automatic weather stations, lightning detectors and wind profilers etc.). This equipment will be designed to log the data and transmit data in real-time using appropriate telemetry systems;
   (c) Strengthen GLOF monitoring and risk reduction, glacier and glacier lake and sediment monitoring and link to community based early warning system;
   (d) Upgrade/install weather and hydrological (drought, flood, climate variability) forecast models to establish effective data sharing protocols;
   (e) Develop and refine weather and hydrological forecast models;
   (f) Through a participatory, community-driven process, design, develop, establish and test community-based early warning systems in priority vulnerable communities using real-time data and information systems that are established by DHM; Develop/update community/district-based disaster risk management plans.
   (g) Support capacity building to promote effective system use, including training, software and hardware, communication/networking systems, dataset procurement, improving business processes.
   (h) Prepare O&M (maintenance, service, calibration, and staffing) plan and finance mechanisms for sustainability beyond life of the project/investment.

7. Subcomponent 2: Establish a climate risk insurance / finance program for vulnerable communities, home owners and women

   (a) Detailed study climate change risk micro-insurance / finance options and modalities for Nepal[1]
   (b) The design, development and establishment of appropriate micro-insurance programs for vulnerable farming communities, home owners and women most probably as a public/private sector partnership. The role out of these programs would include awareness raising programs.

[1] This will build upon findings of the World Bank-financed study on Agricultural Insurance Feasibility for Nepal and papers from the Micro-Finance Summit. (See: *Report of Micro-finance Summit Nepal 2010*. 14-16 February 2010).

Criteria for Technology and Location Selection

8. Subcomponent 1

The establishment of real-time hydro-meteorological infrastructure and weather and flood forecast system will be implemented nation-wide. Exact technology will be selected based on the following criteria:

(a) Inter-operability with current and planned systems
(b) New stations to be established in areas that currently have inadequate coverage but with high local impact to priority vulnerable communities and increasing the range of variables measured, (i.e. glacier, snow, sediment measurements)
(c) Upgrade existing meteorological stations to facilitate real-time data acquisition, and the development of early warning systems for vulnerable communities using such real-time data.
(d) Ease of use, replacement, costs and high likelihood of adoption by users

The establishment of community based early warning systems will be focused in targeted areas that are most vulnerable to climate change impacts. A detailed evaluation and final decision concerning the communities will be conducted during the project preparation phase. Technologies will be selected based on the following criteria:

(a) Ease of use, replacement, costs and high likelihood of adoption by vulnerable communities
(b) Inter-operability with current and planned systems

9. Subcomponent 2

A detailed evaluation and final decision concerning financial instruments and location of the weather-based micro-insurance / finance scheme will be determined during the project preparation phase.

Linkages with Ongoing Activities

These SPCR interventions will complement the following ongoing or planned activities by development partners:

a) UNDP support to disaster risk management, including supporting implementation of disaster risk management plans (e.g., drainage and road/trail improvements, etc.).
b) US$0.75 million Finnish-Nepalese Project for Improved Capability of the Government of Nepal to Respond to the increased Risks Related to Weather-related Natural Disasters Caused by Climate Change and possible follow-on capacity building support for DHM;
c) The establishment of a single radar system (range 200 km) (estimated US$1.5 million) with support from the Indian Government;
d) DHM has been working to install a Telemetry System for Monitoring Water Availability and Allocation in Karnali, West Rapti and Babai river basins under the Irrigation and Water Resources Management (IWRMP) Project funded by the World Bank. The proposed telemetry facilities are expected to provide an efficient water use system minimizing the adverse impacts particularly during floods and low flows.
e) ADB's support for downscaled modeling of global climate change projections in Nepal.
f) The World Bank has completed an Agricultural Insurance Feasibility Study for Nepal from funding from the Global Facility for Disaster Reduction and Recovery
g) USAID/NASA/DHM support for a satellite monitoring glacial melt project.

h) GTZ is considering extending their successful micro-insurance programs of India and China (established with support from the German re-insurance industry (MUNICH-RE) to Nepal.

NGO Involvement

Building on mission consultations held, the Government and MDBs will continue to consult NGOs on the design of this SPCR component. As NGOs have a comparative advantage in working at the grassroots level, an NGO or consortium of NGOs could be engaged (through competitive selection) for implementation, especially to assist communities in developing community based disaster risk management plans, implement community-based early warning systems, implementing micro-insurance / finance programs, and raising awareness.

Indicative Budget: Approximately $40 million with a combination of grant and loan

Lead Agencies: MOE/DHM and MoAC

Other Stakeholders

Component 1: National Disaster Response Committee (facilitated by MoHA), District Disaster Risk Management Committees, DPNet, ICIMOD, Private Sector

Component 2: MoF, MoHA, Private Sector

Component 3 - Mainstreaming Climate Change Risk Management in Development

Rationale/Climate Risks Addressed

1. Building climate change resilience and adapting to the adverse effects of climate change, as defined by the UNFCCC, requires short, medium and long term strategies which should be cost effective, take into account important socio-economic implications, and should be implemented on a stage-by-stage basis. Recognising that building climate resilience and adapting to the adverse impacts of climate change could not be sustained unless the foundations (or enabling environment) was first established, the first meeting of the Conference of the Parties to the United Nations Framework Convention on Climate Change (UNFCCC) (COP-1, Berlin, 1995), decided[1] that adaptation be approached in three stages:

   - **STAGE 1 – *Planning for adaptation* -** which are essentially "enabling activities" required to initiate the first steps in the adaptation planning and management process, including the establishment of climate change focal point, vulnerability studies of possible impacts of climate change to identify specific vulnerable countries or regions and the identification of policy options for adaptation;
   - **STAGE 2 – *Measures to prepare for adaptation***, including further ***capacity building;***
   - **STAGE 3 - *Measures to facilitate adequate adaptation***, including insurance.

2. This phased approach, which systematically builds national capacity through strategic interventions thereby ensuring country-ownership and long-term sustainability, has been successful initiated in Nepal through the following activities:
   i. *sensitisation and building awareness* of climate change impacts and risks at national and local levels and within vulnerable sectors and population groups;
   ii. *building climate monitoring and analytical capacity*, including climate modeling and climate data/records;
   iii. *building adaptation planning capacity* at national and local levels and within vulnerable sectors and vulnerable population groups, initially by facilitating the creation of climate change coordinating mechanism (climate change focal point, climate change committee), stakeholder analysis of existing policies and strategies that may be affected by climate change impacts, and evaluation of functions and risks management capacities of institutions and organisations (at national and local levels), and identifying and prioritising opportunities for addressing identified climate change risks;
   iv. *vulnerability and adaptation assessment* to identify general strengths and weaknesses of baseline conditions and specific needs and concerns, such as potential barriers to adaptation in critical areas or sectors, and opportunities and priorities for adaptation.
   v. *assessment of national, regional and/or subregional vulnerability* to climate change, where appropriate, rely on related data-gathering systems to measure climate change effects in particularly vulnerable regions and strengthen such systems as necessary, and identify a near-term research and development agenda to understand sensitivity to climate change.
   vi. *evaluation and assessment of policy frameworks for implementing adaptation measures* and response strategies in the context of mountain ecosystem management, disaster preparedness, agriculture, fisheries, health, economic

[1] UNFCCC - Decision 11/CP.1 - *Initial Guidance on Policies, Programme Priorities and Eligibility Criteria to the Operating Entity or Entities of the Financial Mechanism*

development and forestry, with a view of integrating climate change impact information, as appropriate, into national strategic planning processes.

vii. *develop, in a participatory manner, climate change adaptation strategy* (or Nation Adaptation Plan of Action - NAPA) which identifies priority approaches, methods and tools for adaptation, and prioritises institutional capacity building requirements at the national, local and municipal levels and within vulnerable sectors.

3. Having successfully undertaken these Stage 1 measures, Nepal is well position to commence the transition to Stage 2 and Stage 3 measures, and the need for such transformational change has been highlighted during the *Adaptive Capacity Assessment* undertaken during SPCR preparation which found that climate risks are not effectively integrated in the planning and implementation of development projects. Particularly at the district and local levels, technical training and financial resources to implement climate change risk management measures are urgently needed.

4. Technical guidelines and training, clarity over mandates among different agencies, enhanced coordination, adequate fund flows and effective resource allocation mechanisms are needed to integrate climate risk management in development planning and implementation. Existing policies and legal frameworks do not bar action, but should be strengthened to address climate change risks. Government and NGOs/CBOs need training and financial resources to implement climate change risk management and DRR measures.

5. SPCR will ***support Stage 2 and Stage 3 measures that focus on the integration of climate change risk management into development planning and implementation,*** and ***establish functional coordination of such activities.***

Project Development Objective

6. This SPCR intervention will facilitate the integration of climate change risk management into development planning by developing climate risk management guidelines and procedures, and implementing a comprehensive program of capacity building for climate change risk management at the national, sectoral, district and local levels, targeting both the public sector and civil society.

Project/Component Outputs and Activities

7. **Output 1:** Nepal has the staffing, skills and capacity required to understand and manage climate risks across a range of sectors and agencies.

Activities:
In order to commence the transition to Stage 2 and Stage 3 measures, the Government of Nepal will undertake the following:

(a) **Establishment of a Climate Change Risk Management Coordination Unit (CCRMC-Unit):** The CCRMC-Unit will be established [within the Ministry of Environment (MoE)] and mandated to coordinate the full range of climate change risk management programming within government (ministries, departments, divisions, sections), I/NGOs, CBOs and civil societies in national, regional and local level.

(b) **Establishment of a Central Climate Change Risk Data Base and Research Centre (CDBR-Centre)**: The CDBR-Unit will be established and mandated to

consolidate and analyse climate change risk data received from various sources including Ministry of Home Affairs, Ministry of Environment, journal publications and other national and international authorities, and liaise with the disaster management unit of Ministry of Home Affairs. The Unit will also support the development of curricula for schools and colleges to ensure the incorporation of climate change risk into such curriculum.

(c) **Appointment of Climate Change Risk Management (CCRM) Officers within Key Organisations and Agencies**: A Climate Change Risk Management (CCRM) Officer will be designated from existing planning officers in relevant divisions/sections of key government organizations and agencies.[2] CCRM officers will receive training on integrating climate change risk management into the day-to-day operations of their respective organisations by the **CCRMC-Unit**, and will be responsible and accountable to the **CCRMC-Unit** for ensuring that climate change risk has been mainstreamed in their respective organisations.

8. **Output 2:** Nepal has developed guidelines and procedures for climate risk management and begun to implement them across a range of sectors, agencies, and policy planning and implementation processes.

Activities:
In order to assist GON transformational efforts to Stage 2 and Stage 3 measures, the SPCR will support the following interventions:

(a) **Preparation of Climate Risks Management Manuals and Guidelines**: Based on international best practices, guidelines and training manuals will be prepared for use by government, private sector and NGOs/CBOs to integrate climate change risk management into physical planning, water resource management, disaster preparedness, agriculture, fisheries, health, livelihoods programs, forestry, environmental impact assessments, infrastructure design and urban planning. Engineering design criteria, land zoning and building codes will be examined, as well as sectoral policies and programs, and national development strategies. In particular, guidelines will be prepared for conserving drinking water sources, extracting sand and gravel from river beds, and designing flood and mass movement hazard control measures.

(b) **Training on Climate Change Risk Management**: Utilizing the climate change risk management guidelines and manuals to be developed under this Project/Component (see below) an intensive training package on climate change risk management will be developed. Its objective will be to train CCRM-Officers and relevant stakeholders in government, private sector and NGOs/CBOs to enhance their capacity in the field of climate change risk identification, assessment, analysis, quantification, prioritization, planning (management plan, implementation plan, and rehearsal plan), monitoring and evaluation.

[2] These might include National Planning Commission (NPC), Ministry of Finance, Ministry of Home Affairs, Office of the Prime Minister, Ministry of Local Development, Ministry of Forest and Soil Conservation, Ministry of Environment, Ministry of Energy, Ministry of Physical Planning and Works, Ministry of Health, Ministry of Agriculture and Cooperatives, Water and Energy Commission Secretariat (WECS), Department of Water Induced Disaster Prevention (DWIDP), Department of Health, Department of Agriculture, Department of Forestry, Department of Road, Department of Irrigation, Department of Hydrology and Metrology, Armed Police Force, Nepal Military, Alternative Energy Promotion Centre (AEPC), Rural Water Supply and Sanitation Fund Board, Poverty Alleviation Fund(PAF), Roads Board Nepal, Local Governance and Community Development Program (LGCDP), District Development Committees, office of the Chief District Officer (CDO), VDCs and Municipalities, Federation of Nepalese Chambers of Commerce and Industry (FNCCI), select I/NGOs and members of civil society working in the field of climate change risk management.

(c) **Climate Proofing Nepal's Private Sector**. SPCR intervention will be used to strengthen climate change risk management capacity in Nepal's private sector. This SPCR intervention will include an assessment of private sector activities that are at risk, including the following:

- Floods – Damage to infrastructure (housing and industrial estates, hydro-power facilities), impact on costs of loans/mortgages, impact of water-borne and vector-borne diseases on productivity;
- Drought – Impact on agricultural and livestock products for markets, food prices, impact on water intensive industries (e.g. Bottled Water), increased demand for water conservation/storage technologies;
- Heat extremes – Increased energy costs, stress to employees and livestock/poultry, reduced tourist arrivals;
- Climate variability – Impact on tourism product, viability of tea industry and other cash crops and forest products (pests and disease).

Guidelines will be developed on climate proofing the private sector, and training/awareness programs delivered/implemented to facilitate the integration of climate change risks management into Nepal's private sector. A portion of the SPCR grant under this sub-component will be used to strengthen climate change risk management capacity in Nepal's private sector.

(d) **Implementation of Climate Change Risk Management Measures**: Under the guidance of the CCRMC-Unit and the NPC, the CCRM-Officers will implement the newly developed climate risk management processes and guidelines, thereby integrating climate change risk management into the core functions of their organizations.

(e) **Integrating Climate Change Risk into Development Process**: The newly developed climate change risk management guidelines will be integrated into the EIA process, infrastructure development (road, water storage pond, bridge, hydro-power, irrigation system, drinking water supply system) and physical planning.

(f) **Policy Formulation:** Lessons learned during the project period will be compiled, synthesized, analysed, and quantified. All the activities and tools implemented during the project period will be monitored, refined and evaluated by the **CCRMC-Unit**. Final output and lessons learned will be disseminated by NPC among concerned authorities and stakeholders. Based on the lessons learned, NPC will guide the integration of climate change risks into the formulation of national development policies and sector programs as appropriate.

Linkages with Ongoing Activities

11. These SPCR interventions will be compatible with the following ongoing or planned activities by development partners:
    a. ADB's MOE Capacity Strengthening TA
    b. EU/DFID US$20 million (est.) program support for climate change risk management;
    c. UNDP's ongoing program on disaster risk management and which includes capacity building and training at national, district and community levels.

Lead Agency: MoE

Indicative Budget: US$10 million (anticipated grant financed)

Component 3 - Observations and Next Steps

The mission recognized the vital importance of Component 3 to mainstreaming climate resilience in Nepal's development planning. In moving forward with the preparation of this Component the mission agreed to partner with MoE in looking at the following issues during detailed TA design.

Lessons from similar previous and ongoing TA

1. **Staffing**. Experience in current TA suggests that appropriate knowledgeable staffing is needed to manage TA activities and to guide and supervise TA consultants. It has been observed that MoE officials are managing TA projects in addition to their existing and already full-time workload. The mission team and MoE brainstormed that up to 5 full-time staff would be needed to support Component 3 in the areas of project management, financial management, procurement, and administrative support. Decisions about appropriate amount of staffing should be made considering lessons learned from ongoing TA.

2. **Financial and Procurement Management**. This Component, with an indicative budget of $10m, would be substantially larger than any TA the Ministry has managed so far. Given the challenges encountered in managing the ongoing TA programs in the Ministry, special attention should be given to assure that appropriate full-time and knowledgeable financial management staff are assigned to the project and given the training as required on procedures and guidelines to manage the budget and finances according to MDB standards. Additional support may also be required to train staff on procurement procedures, including selection, recruitment and contracting.

Project Design Issues

3. **International Consultants**. The PPCR will be piloting innovative responses to climate change. International expertise will therefore be needed to bring the latest skills and knowledge to the program. The mission recognizes the preference of the GoN to minimize the use of international consultants, but noted that in the context of this pilot the use of international consultants will likely be an important element for success, taking into consideration the preliminary review of the Nepalese expertise available and MDBs' policies. The international experts will, inter alia, ensure capacity building and transfer of skills to national personnel so that foreign experts will not be required in the future.

4. **Authority of MoE staff**. Component 3 will require many activities to be carried out at once. . This will require considerable paperwork and authorizations in order to speed up progress. Staff assigned to the TA should be a level of authority to make decisions independently in day-to-day TA matters. Moreover, they should have the required knowledge to function as counterpart staff who might be trained, if necessary, by the consultant experts hired.

5. **Inter-agency Coordination**. Various approaches have been used to ensure coordination across agencies and to motivate officials from outside MoE to participate actively in TA activities, such as exposing government agencies officials to good practice in other countries, and bringing officials outside Kathmandu for workshops. It was agreed that MoE

in collaboration with MDBs will explore options/possibilities for achieving the expected results in interagency coordination in Component 3.

Overlap with ongoing initiatives

6. The mission noted that several ongoing TA projects have potentially overlapping activities in the areas of (i) Institutional Development, (ii) Capacity Building and (iii) Knowledge Management. In particular the mission suggested that the activities under the following projects should be examined to avoid duplication, if any:

- ADB-supported Capacity Strengthening TA (MoE)
- ADB- financed TA "Building a Climate Resilient Development Plan" (NPC)
- NAPA to Climate Change Project
- Proposed DFID/EC-supported climate adaptation programme
- UNDP-supported training/capacity building for DDCs on disaster risk reduction

Component 4 – Building Climate Resilient Communities through Private Sector Participation

Rationale/Climate Risks Addressed

1. Building climate resilience in Nepal cannot be achieved by the public sector alone and requires the engagement of multiple stakeholders including the private sector. The private sector can play an important role in delivering interventions that support the Government's priorities in climate resilience.

2. While building climate resilience is still seen globally as more of a public sector focus, the private sector can play a major role in addressing climate change risks within vulnerable communities. The private sector has particular competencies which can make a unique contribution to building climate resilience in vulnerable communities, through innovative technology and financing, design of resilient infrastructure, development and implementation of improved information systems and the management of major projects. Private sector can help vulnerable communities adapt to climate change. The private sector is also the principal "supplier of innovative goods and services" needed to support transformational change to a climate resilient economy.

3. The focus of this SPCR component is to address key market barriers that prevent the private sector from playing its role in climate change adaptation. The key barriers include the lack of capacity to assess and manage climate risk within private supply chains, and a limited understanding amongst companies of the potential commercial opportunities that arise as others seek to become more resilient. Additionally, one important constraint in private sector engagement in building climate resilience is the lack of capacity of financial institutions to "climate proof" projects. This lack of understanding of climate change risks affecting investments and their risk profiles means that banks often find it difficult to develop and structure appropriate financial products including micro-financing for vulnerable communities. Most of the commercial banks in Nepal rely on short term deposits, and an asset-liability mismatch also limits their ability and willingness to structure financial products with the longer tenure that is typically needed for climate change investments.

4. The *Adaptive Capacity Assessment* undertaken at the district and community levels during SPCR preparation has highlighted the vulnerability of communities in remote areas to impacts from climate change. In particular the need for micro-insurance/finance by farming communities, home owners and women has been identified as an urgent priority in order to address critical vulnerability to climate change impacts by these populations groups.

5. The agriculture sector in particular faces climate-related risks. Crops currently grown in Nepal are vulnerable to projected increases in temperatures and extreme events. Climate change is expected to result in a net decline in the productivity of major crops. Nepal will need more climate-resilient seed. Nepal imports mostly hybrid seeds. Many farmers still resort to traditional forms of seed supply. Communities consulted during SPCR planning have highlighted a decline in fodder and forage production and an increase in the pest attacks. The performance of the locally grown crops is likely to be affected with increasing climate variability. The percentage of people with access to improved crop varieties in Nepal is low – particularly in regards to rice, maize, wheat and others. It is anticipated that improved access to quality seed would result in a 20% increase in yield. Thus the availability of good quality seeds and those that are climate resilient would be the pre-requisites to sustain current production levels and ensure sustainable livelihoods and food security.

6. Climate change is expected to result in increases in landslides, flash floods, and forest fires. Many villages in the mountain eco-regions are situated on or adjacent to the unstable hill slopes. About 41 percent of the population still lives in less than adequate housing for example houses with thatched roofs and straw walls, sometimes supported by pillars made of bamboo or old timber. These dilapidated houses are also a fire risk; nearly 10,000 families lose their homes to fire every year. Thousands of others lose houses to landslides, floods and other natural disasters each year. Many vulnerable communities do not have emergency shelters to which people can proceed when their homes are destroyed by extreme events, or where emergency supplies can be stored and distributed in times of need. Thus improved availability of low cost emergency shelters and housing would build climate change resiliency in vulnerable communities.

7. The *Adaptive Capacity Assessment* undertaken during SPCR preparation has highlighted that knowledge in Nepal is inadequate to address climate change risks and therefore the planning of development projects follows a "business as usual" path. Climate change risk management capacity is virtually non-existent in the private sector. Government, the private sector and NGOs/CBOs need training and financial resources to implement climate change risk management and disaster risk reduction measures.

8. Key challenges in enhancing resilience to climate change in Nepal are ensuring water and food security, managing disaster risk, protecting climate sensitive infrastructure, and access to finance. Consultations with private sector confirm that they have a key role to play in these areas.

Program Objective

9. Strengthen capacity, improve access to climate resilient technologies, and reduce key market barriers that prevent the private sector from playing a key role in building climate resilient communities.

10. The objective will be achieved through a financing envelope (concessional loans and grants) that would support building climate resilient communities through private sector participation. The grant element will be used primarily for capacity development in integrating climate risks, covering incremental costs and increasing awareness of climate risks among the private sector. Activities for this component support private sector engagement in the SPCR Components 1, 2, and 3 as the SPCR recognizes that the private sector is an important underpinning and cross-cutting delivery mechanism. The activities are described under the Outputs below.

Component Outputs

11. **Output 1: Capacity building and investments in climate resilient technologies to support food security, manage disaster risk and promote infrastructure climate proofing**.

    (a) ***Food Security and extreme events****:* - Building on Components 1 and 2, this intervention would support private sector engagement to promote climate resilient seeds, and early warning systems to vulnerable communities, and would involve the following activities:

    - Awareness raising and capacity building activities of the major players in the seed value chain including the farmers and strengthening the capacity of the Agro Enterprise Centre under FNCCI. It is recognised

that the Ministry of Agriculture and NARC have an important role in seed research, development and testing and the private sector's role will be primarily for production and marketing of the climate resilient seeds. Collaboration between the public and private sectors in this component is important.

- Development of Early Warning Systems for farmers (e.g., notification through information communication and technology) by the private sector with regard to protecting crops in times of extreme events. This requires collaboration with the government as it is the source of weather related data.
- Concessional loans will be used to provide the private sector with long term concessional loan facilities to locally produce and market climate resilient seeds suited for use in Nepal. In addition, sustainable supply chains will be developed in order to deliver these improved seeds and support services to vulnerable communities.

(b) ***Managing Disaster Risk:*** – Linking to Component 2, this intervention will provide low cost, storm proof emergency shelters and individual climate resilient housing through a climate resilient home building finance program with the following activities:

- Evaluation of various construction designs for multi-use shelters, cold storage and low cost housing for vulnerable communities.
- Regeneration of bamboo plantations to ensure sustainability of the resource used for the constructions of multi-use shelters and low cost housing and link the farmers with the developers.
- Concessional loans will be used to provide the private sector with long term and low interest rate loan facilities to support the development of low cost multi-use emergency shelter, crop storage and housing products. Loans will be provided to the house owners through local Financial Institutions.

(c) ***Protecting Climate Sensitive Infrastructure*** – This builds on Component 2 and 3 in promoting private sector initiatives in climate proofing infrastructure.

- Assess private sector activities that are at risk from floods, drought, heat extremes and climate variability and assist the private sector to make investments in the affected sectors.
- Develop guidelines on climate proofing the private sector and deliver training/awareness programs to facilitate the integration of climate change risk management into Nepal's private sector.
- Concessional loans will be provided to the private sector to support incremental costs associated with climate proofing existing operations, and the conversion to climate resilient technologies.

12. **Output 2: Access to finance to build climate resilient communities** – This Output links to Component 2.

- Detailed study of climate change risks and development of appropriate micro-finance options and modalities to address the risks for vulnerable communities
- Design, develop and establish appropriate micro-finance and micro-insurance products for vulnerable farming communities and home owners, especially women. Micro-insurance products will depend on the government putting in place the necessary regulations, policies and structures to enable the private sector to participate in micro insurance.

- Concessional loans will be used to finance climate resilient micro investments, while grants will be utilised to raise awareness and strengthen the capacity of MFIs.

13. Role of the Government

The role of the government is to create an enabling environment that effectively leverages private capital and know-how to deliver effective modalities and instruments to address climate change at the scale and pace needed.

14. Role of the NGOs

Possible areas of synergies and collaborations with NGOs/CSOs will be explored in order to achieve broader leverage in each of the identified intervention areas.

Linkages with Ongoing Activities

i) Micro Finance - IFC Program with Nirdhan MFI
ii) Low Cost Housing and Shelter – Habitat International, SNV, INBAR
iii) Seeds – CIMMYT/SARO, OXFAM GB, NARC
iv) Climate Proofing Vulnerable Infrastructure – CEDAN, IPPAN,
v) Commercial Agriculture Development Project-ADB
vi) Project on Agriculture Commercialization and Trade-WB

Indicative Budget: Approximately $13 million with a combination of grant and loan

Possible Relevant Stakeholders:

Government: NARC, Seed Quality Control Center, MoPP, MoF, National Disaster Risk Management Committee

Private Sector: FNCCI, CNI, Commodity Associations and Private Companies