I. Project Context

Country Context

Nepal is a small land-locked country in the heart of the Himalayas, with China on its northern border and India to the south. The country is about 850 km across along its east-west axis, and about 200 km north to south. It can be divided into three ecological regions that run like horizontal strips dividing the country into three roughly equal areas: (i) the high mountains (35% of total area), (ii) the middle hills (42% of total area), and (iii) the lower altitude Terai (23% of total area). Each region has distinct altitude and climatic characteristics, varying from alpine to sub-tropical conditions. Altitudes range from over 8800 meters in the north at the peak of Mount Everest, to just 60 meters above sea level in the southern plains. Although Nepal only comprises about 0.1% of Earth’s terrestrial area, it harbors a high share of the world’s biodiversity, confirming its unique geographic nature. A total of 118 ecosystems have been identified, with 75 vegetation types and 35 forest types. Both its floral and faunal diversity is notable.

In 2006, Nepal emerged from a prolonged internal conflict with the signing of the Comprehensive Peace Accord laying out a roadmap to a lasting peace and the construction of a new governance structure. In 2008, a constituent assembly (CA) was voted into power, the monarchy was abolished, and a president and a prime minister were formally elected. A series of coalition governments have been formed and the process of writing a new constitution remains underway. The CA was dismissed in May 2012 without completing the constitution. New elections are yet to be announced.

Nepal is making marked gains in eradicating poverty, but remains one of the poorest countries in the world. Nepal attained the first Millennium Development Goal – reducing extreme poverty by 50% – ahead of time, and broader poverty measures have also declined from 31% in 2003/2004 to 25% in 2010/2011. Still, GDP per capita remains low at US$712 (2011). Poverty varies widely across geographic location, ethnicity, caste and gender. The population is largely rural and heavily dependent upon agriculture. About 82% of the population (currently estimated at around 26.6 million) lives in rural areas and agriculture contributes 35% of GDP. Poverty is much more severe in rural areas (27%) compared to urban areas (15%) and particularly severe in mountainous areas (42%). Real GDP growth in FY11 was 3.88 percent, with agriculture, construction, financial and other services, and consumption being the major sources of growth.

Nepal has water and hydropower potential on a scale relevant for the region. The Himalayan region is the most glaciated area outside of the Polar Regions, and is often referred to as the “Third Pole.” It is the source of major rivers that flow as far west as Iran, and east to the China Sea. All of Nepal’s rivers flow into the Ganges, a river of great cultural and religious significance and the most populous river basin in the world. Some 650 million people live in the Ganges basin, shared by Bangladesh, China, India and Nepal. Over 40% of Ganges waters rise in Nepal making the country’s climate and hydrology significant for the region as a whole. In addition, more than 43,000MW of economically feasible hydropower potential have been identified in Nepal. Less than 2% of this potential is currently developed and domestic demand is projected at less than 2,400 MW for the coming decade, suggesting that Nepal could earn significant export revenues and serve as an important source of clean energy exports for this fast growing, energy hungry region.

II. Sectoral and Institutional Context

In 2011, the global risk analysis firm Maplecroft ranked Nepal the 4th most climate vulnerable country in the world. Nepal’s extremely varied and challenging geography, its poor, resource dependent population, and its weak institutional capacity all combine to create this vulnerability. Climate projections for the country predict increases in temperature and increases in the frequency of extreme events. A climate risk assessment carried out specifically for the Nepal Strategic Program for Climate Resilience (SPCR) at the sector, district and community levels identified the following critical risks: (a) water quantity and quality, (b) food security (c) eco-system health, (d) animal and human health, (e) vulnerable groups, and (f) economic growth and sustainability. Although these risks are experienced differently across the country, some common themes are evident from the assessment including focuses on natural resources management and the protection of vulnerable groups.

The greatest influence on Nepal's climate is the South Asian monsoon, which will likely become more intense and less predictable. The
monsoons enter Nepal from the southeast, with precipitation beginning as they reach the lower hills of the Churia range which act as the first monsoon barrier. The high mountains of the Himalayan range act as a final barrier to the monsoon, creating a rain shadow to the north in the Himalayan Plateau. Average annual rainfall is approximately 1800 mm. The SPCR risk assessment found that the priority concerns of all communities were in securing water for drinking and agriculture, and protecting themselves from flood and water-borne diseases. These concerns directly affect agricultural productivity and food security, and often disproportionately impact women and vulnerable groups. More specifically, greater water scarcity was anticipated in the high mountain region; water quality and availability were the most pressing concerns in the middle mountains; and water-related disasters (i.e., drought, flooding, landslides, sedimentation and water-borne diseases) were priorities in the Churia/Terai region.

The Himalayan glaciers are another prominent feature of Nepal's climate. In addition to the effect of the high mountain range on the monsoon, the snow and ice of the glaciers act as natural water storage. Glacier melt is an important contributor to base flows in the Himalayan rivers and changes in the snow line and glacier melt dynamics could have serious affects on high altitude ecosystems and mountain communities. The melting of glaciers has also led to the growth of numerous glacial lakes in Nepal. Glacial lakes form when glaciers melt and water is captured behind the glacier's terminal moraine (a natural dam of rubble and ice that forms at the tongue of a glacier.) As the pressure of the growing glacial lake increases, these natural dams can become unstable causing Glacial Lake Outburst Floods (GLOFs).

Water resources are among Nepal's major strategic assets, but their extreme variability undermines growth in several ways. Nepal is drained by a dense network of about 6,000 rivers and rivulets. Together with groundwater, these substantial water resources underpin key growth sectors including agriculture, industry and hydropower, as well as providing essential water supplies for domestic use. But 80% of rainfall is concentrated during the summer monsoons, between the months of June and September, bringing devastating floods and mudslides. During the remaining eight months there is very little precipitation and the country often suffers drought. Agriculture, which contributes 35% of the country’s GDP and provides employment to 80% of the population, is predominantly rain-fed and especially vulnerable to changes in weather patterns and extreme events. Variability in water flow and availability also has a significant impact on the hydropower sector which provides most of the nation's power. Insecure water supplies at the household level can also be extremely costly in terms of health impacts and the need for women and girls to spend additional time fetching water from more distant sources.

Food security, which is tenuous at present, could be further undermined. Climate change is expected to affect agricultural productivity through three primary channels: (i) rising temperatures, (ii) climate variability and related changes in the timing, intensity, and volume of rainfall, and (iii) rising carbon dioxide levels. The magnitude and consequences of these changes on agriculture is currently highly uncertain because of the extreme complexities of downscaling global climate models and in particular for projecting changes at high elevations and in monsoonal climates. Nevertheless, evidence suggests that the observed changes in temperatures and soil moisture are negatively affecting agriculture in many parts of Nepal. The 2008-2009 winter drought, one of the worst in the country's history, saw wheat production fall by 14% and barley production by 17%. Some districts in the mid-west and far-western regions received less than 50% of average rainfall for the November 2008 to February 2009 period, and their crop yield dropped by more than half. More than two million people were at risk of starving.

The threat of climate change on Nepal's rich biodiversity is evident in the shifting of agro-ecological zones, prolonged dry spells, encroachment of alien and invasive species, and increased prevalence of disease and pests. Globally, temperatures appear to be rising faster at higher altitudes. Ecological belts are expected to shift upward with the rise in temperatures. A similar upward movement of species, however, may be limited by environmental circumstances, such as soil and moisture conditions and hostile topographies. Tree lines will likely shift slowly because of the limited natural dispersal of seeds. Reduced snowfall, untimely rains, and increased dryness may alter the flowering and fruiting behavior of plants. Many observations suggest that recent climatic changes have already influenced animal and plant populations in a number of ways: the timing of seasonal events (e.g. flowering, migration), growth and reproduction rates, and in the distribution of species. Ultimately, these changes are likely to lead to species and habitat loss.

Poor and rural populations, and women, are the most vulnerable to climate risks in Nepal. The poor are largely dependent upon subsistence agriculture for their livelihoods. Climate change is expected to increase floods, droughts, and ecosystems degradation, directly affecting these livelihoods. More than any other group, poor subsistence farmers are unable to cope with such changes. These and other pressures force large numbers of people in Nepal (mostly men) to move out of their rural communities and augment their livelihoods with income earned in large cities and abroad. In Nepal nearly 19% of GDP is from remittances. This leaves women with additional burdens to manage their households, the elderly, the sick, and the young while continuing the farming operations needed to sustain the family. Even in the absence of the additional challenges posed by out-migration, women's daily activities are closely related to natural resources and are vulnerable to climate variability. Changes in precipitation and temperature patterns affect the availability of fuel wood, fodder, grasses and drinking water, all resources that women typically collect for their homes and families. Women will likely face longer distances and greater scarcity when collecting such supplies. These factors add to the daily drudgery that women face particularly in high and mid-mountain regions.

Vulnerability to weather-related hazards is an important obstacle to growth and one that disproportionately affects women and children. Estimates by the Ministry of Home Affairs suggest that all of the disasters reported, floods and landslides are the most devastating in terms of the number of deaths that occur and the damages they cause. Between 2001 and 2008, floods and landslides killed 1,673 people, affected 221,372 families, killed 33,365 livestock, destroyed 52,007 houses and washed away or destroyed over 22,000 ha of land. UNDP (2009) reported that the direct economic losses associated with natural disasters for the period of 1977–2003 averaged NPRs 16,120 million (approximately USD $200m in 2004 values.) Studies in Bangladesh have shown that women and children are 14 times more likely to die in the event of a natural disaster than men. GoN highlighted Nepal’s vulnerability in the National Strategy for Disaster Risk Management. In order to support GoN in developing a long term Disaster Risk Reduction Plan, a unique institutional arrangement that unites development and humanitarian partners, was set up, namely the Nepal Risk Reduction Consortium. The Consortium has identified five flagship areas of immediate action in disaster risk management.

Recent records in Nepal show increasing incidents of droughts, floods, hailstorms, landslides and crop disease. The Intergovernmental Panel on Climate Change’s (IPCC) Fourth Assessment Report indicated that Nepal would suffer increased flooding due to changes in patterns and intensity of rainfall, leading to an increasing loss of life and decrease in crop yields. In addition, the IPCC also stressed the existence of a 'white spot' over Nepal and much of the region, indicating that the available data are inadequate for the development of reliable climate models.

The need for a well functioning early warning system was identified as a key priority in the GoN's National Strategy for Disaster Risk Management. Key elements of a well functioning modern hydrometeorological system include efficient data collection, transmission, storage,
processing, use and dissemination to the public, government agencies and targeted user groups. In Nepal, the Department of Hydrology and Meteorology (DHM), which is under the Ministry of Environment, Science and Technology (MoEST), is mandated to collect, process and disseminate hydrological, meteorological and climate information to a range of users. Much of Nepal's hydrological and meteorological system relies on manual data collection with infrequent and unreliable reporting. There is real time access to some data and a limited automated hydrological network that is operated by a local private sector company on behalf of DHM. Transmission of data from the existing observation networks is also irregular and mainly relies on mobile telephones with information redistributed through the internet. From a service delivery standpoint, there is no system in Nepal for issuing authoritative warnings for weather and weather extremes to government authorities and key user groups, nor a system for issuing timely and targeted warnings to communities at high risk. Some civil society organizations are exploring the potential of mobile phone networks in transmitting early warning messages to people at risk. For local communities, the implications of a weak early warning system have extraordinary costs in terms of the likely impact on their lives, livelihoods and management of assets.

Agro-meteorological information is another urgent priority to manage and mitigate climate risk in Nepal's large and highly vulnerable agriculture sector, and to underpin the country’s food security efforts. A science-based agriculture information system is needed to deliver information and climate risk management tools that will provide the agricultural sector with a decision support information system to mitigate climate-related agricultural production risks. Seasonal climate predictions are currently not available in Nepal, but should be developed. Other priority climate change adaptation information tools include an agro-weather and agro-climate advisory system (Agricultural Management Information System). These could provide (i) an agricultural drought reference index to inform farming communities whether the amount of water in a root zone is sufficient or not to meet the needs of a crop at a particular time; (ii) pesticide application advisories on how, when and when not to apply pesticides as part of Integrated Pest Management strategies; (iii) crop planting advisories that can deliver timely information about when to plant in order to achieve higher outputs; (iv) pest and disease information to provide farmers and agricultural extension workers with targeted and timely information on the likely risks of specific pests and plant diseases; and (v) data and models required for climate and weather risk transfer.

Transformation of Nepal's hydrometeorological services into a modern, service-oriented system will build resilience today as well as adaptive capacity for the future. Nepal today is hard pressed to cope with the current extremes of weather and climate variability. Existing natural variability is much greater than potential long-term climate changes. Increasing resilience to the existing climate and weather extremes will be a first order adaptation measure. A transformation of the system is urgently needed to cope with existing variability, as well as to prepare for the consequences of climate change. Strong capacity to monitor and forecast water, weather and climate variability, and to deliver this information in timely and usable ways is essential to improving climate resilience in water and weather-dependent sectors and in vulnerable communities. The envisioned system will also have significant benefits for the aviation sector. Advanced information on weather conditions could enhance safety and reduce financial loss. Given its unique geographic position, modernization of the hydrometeorological system in Nepal will also generate water, weather and climate information that can be of substantial regional and global value. In turn, improved regional and global climate forecasts will benefit Nepal.

III. Project Development Objectives

Project Development Objective: The main objective of the proposed project is to enhance government capacity to mitigate climate-related hazards by improving the accuracy and timeliness of weather and flood forecasts and warnings for climate-vulnerable communities, as well as developing agricultural management information system services to help farmers mitigate climate-related production risks.

This would be achieved by establishing multi-hazard information and early warning systems, upgrading the existing hydrometeorological system and agricultural management information system, and enhancing capacity. Activities funded through the project would help improve decision-making and planning in key climate-vulnerable and water resources dependent sectors particularly agriculture, health, water and disaster management, and contribute to building climate resilience for communities at risk.

IV. Project Description

Component Name
A. Institutional strengthening, capacity building and implementation support of DHM
B. Modernization of observation networks and forecasting
C. Enhancement of the service delivery system of DHM
D. Creation of an Agriculture Management Information System (AMIS)

V. Financing (in USD Million)

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VI. Implementation

The project will be coordinated by MoEST and implemented by DHM and MoAD. DHM will implement three components: Institutional Strengthening, Capacity Building and Implementation Support of DHM (Component A), Modernization of Observation Networks and Forecasting (Component B), and Enhancement of the Service Delivery System of DHM (Component C). MoAD will manage Component D: Creation of an Agriculture Management Information System (AMIS).

Project implementation arrangements. The GoN is establishing a Climate Change Coordination Committee, chaired by the Honorable Minister for Environment, Science and Technology and the National Planning Commission (NPC) member responsible for Environment, to provide oversight and guidance for all climate related projects in the country. In addition, for this Project specifically:

(a) Overall coordination for this project and the other four PPCR projects will be provided by MoEST as the focal Ministry for the PPCR.
(b) An inter-Ministerial Project Steering Committee will be established, chaired by the Secretary, MoEST, and including representatives from MoF, National Planning Commission (NPC), DHM, MoAD and other key stakeholders, to provide policy guidance and ensure coordination across Components A, B, C and D.

(c) Two Technical Committees will be established, one chaired by DHM focusing on Components A, B and C, and the other chaired by MoAD focusing on Component D. The Technical Committees will be chaired by Joint Secretaries/Directors General and include relevant technical experts to strengthen project implementation. The two committees will coordinate as needed to support effective implementation of the Project.

(d) Project Management Units (PMUs) will be established in each of the two implementing agencies (DHM and MoAD) and will include technical, financial, procurement, monitoring and evaluation, environment and social specialists as needed. The PMUs will report to their respective Technical Committees, and liaise with the Mainstreaming Climate Change Risk Management in Development Project of the Nepal PPCR to ensure knowledge management across the five SPCR program components. The General Consultant/System Integrator will provide assistance to DHM and the PMU in developing the detailed technical designs of the future systems. This includes providing assistance to MoAD and the PMU, and helping to link DHM and AMIS operations.

(e) The project will be implemented in accordance with the Project Appraisal Document (PAD), the Project Implementation Manual (PIM) and all relevant legal agreements. The PIM will include: (i) detailed descriptions of project components; (ii) a funds operating manual; (iii) implementation arrangements and agreed guidelines for different project components; (iv) detailed project cost estimates; (v) a procurement plan; and (vi) an Environmental and Social Management Framework (ESMF). The PIM will be amended periodically to incorporate adjustments during project implementation in agreement with the Bank.

(f) The DHM PMU will include a Project Director, Technical Coordinator, Financial Consultant, Procurement Consultant, a Social, Training and Communications Consultant, an Environmental Consultant, and a Monitoring and Evaluation Consultant. All PMU staff except the Project Director will be consultants. In addition, officials of the Accounts Section in DHM will provide support to the PMU. The DHM PMU will work closely with the General Consultant/Integrator.

(g) The MoAD PMU will include a Project Director, a Technical Coordinator (Agriculture Officer), an Accounts Officer, a Procurement Consultant, a Social and Communications Consultant, and a Monitoring and Evaluation Consultant.

VII. Safeguard Policies (including public consultation)

<table>
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VIII. Contact point

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