

## Climate Change: Project Adaptation Action (PAA) Report

### Part 1: Climate Change Adaptation

<b>BASIC PROJECT INFORMATION</b>			
Project Title: Bagmati River Basin Improvement Project		Sector: Natural Resources and Agriculture	
Location: Bagmati River Basin, Nepal		Estimated ADB Financing:\$36,000,000	
Brief Description:		Implementation Period: 2014-2019	
<p>The Project will complement ongoing efforts of the Government of Nepal and the civil society towards improving water management and river environment in the Bagmati River Basin (BRB). The Project will invest in forming a river basin organization with adequate capacity and decision support systems for integrated water resource management (IWRM). It will finance: the construction of upstream water storage, river bed oxygenating weirs, river bank beautification, community initiatives for river environment improvement in the Kathmandu Valley, and a flood forecasting and early warning system for the entire BRB.</p>			
Climate Change Classification: Adaptation			
<b>SUMMARY of CLIMATE RISK SCREENING</b>			
<p><i>(Screening will be done using GIS and Remote Sensing techniques built through three sets of databases: Geological, Climate and Knowledge base. Other climate change assessment reports or databases can be used provided they are from reputable sources and appropriate scope.)</i></p>			
<p>A. <i>Projected changes in the Upper BRB.</i> SRES A2 scenario is used for annual average daily temperature at Kathmandu Airport with baseline 1971 – 2000 and predicted values for 2080s. SRES A1B is used for average annual total precipitation and baseline is 1994 – 2000 and projected values for 2060s.</p>			
Temperature (°C)	Precipitation (mm)	Sea Level Rise (masl):	Others:
From: 18.3	From: 2,865	Not applicable in	
To: 20.4	To: 3,170	proposed project	
<b>B. <i>Climate Risks</i></b>			
1. Flood	Y	Climate induced risks to water resources facilities in the BRB include: flooding, landslides and sedimentation as well as greater unreliability to dry season flows that poses potentially serious risks to water supplies and irrigation during the lean season.	
2. Landslides from precipitation	Y		
3. Drought	Y		
4. others	Y		
<b>C. <i>Recommendations</i></b>			
<p>Activities:</p> <ol style="list-style-type: none"> <li>1. Improve strategic planning of water resources allocation and management.</li> <li>2. Improve flood risk management.</li> </ol>		<p>Requirements for TOR:</p> <ol style="list-style-type: none"> <li>1. Strengthen institutional arrangements for basin management.</li> <li>2. Capacity building of water users in efficient water management.</li> <li>3. Improve flood forecasting systems and provide a flood early warning system.</li> </ol>	
Risk Classification: ( <i>Low, Medium and High Risk</i> ) – Medium			
<b>DUE DILIGENCE</b>			
<p><i>(Enumerate the type of analytical or fact finding activities conducted during project preparation)</i></p>			
<p>Information from recent analyses is used to assess likely changes on temperature and rainfall in the BRB and was used to appraise the resilience of the proposed infrastructure investments to climate change.</p>			
<p>For temperatures, the Hadley Centre Coupled Model, version 3 (HadCM3) General Circulation Model</p>			

(GCM) was used for Special Report on Emissions Scenarios (SRES) emission scenarios: A2 and B2. SRES A2 scenario describes a world with a continuously increasing population with regional orientation in terms of economy and culture, while SRES B2 represents a world in which the emphasis is on local solutions to economic, social, and environmental sustainability with a continuously increasing population (lower than A2) and intermediate economic development. The analysis revealed the average mean maximum temperature in BRB will increase by 1.5 to 2.1 degrees Celsius under various emission scenarios for the 2080s compared with the baseline period. (from: *Babel et al, 2011, Impact of Climate Change on Hydrology in the Bagmati River Basin of Nepal*)

Likely changes in precipitation are assessed using the latest downscaled projections for SRES A1B from the ADB-financed TA “*Strengthening Capacity For Managing Climate Change and Environment*” (TA 7173-NEP, completed in July 2012). SRES A1B is a balanced scenario of fossil and non-fossil energy compared to a heterogeneous world defined in A1 scenario and a convergent world defined in B2 scenario. This analysis predicts that annual and monsoon rainfall in the upper BRB is projected to decrease by 2% and 8% respectively from 2020 to 2040, but projected to increase by 11% and 6% respectively from 2041 to 2060 compared to the baseline period.

The annual average runoff to the Dhap reservoir is about 160% of the reservoir capacity. With the projected reduction in rainfall during the first 20 years this runoff is likely to reduce however the reservoir is expected to fill most years during this period. Variations from one year to another are projected to increase with more extremes and therefore regulation of flows through reservoirs will be beneficial in maintaining the required flow in the river during the dry season. The spillway of the Dhap reservoir and river improvement works have been designed accounting for likely impacts of climate change.

#### **PROJECT DESIGN CHANGE OR ADAPTATION RESPONSE**

*(Describe key action items and budgetary allocations, and other response measures relevant to the project)*

The project will:

1. Develop a river basin organization and provide capacity development for application of integrated water resources management to improve inter-sector management of water resources and as a front-line adaptation response and to lead development of adaptive basin management plans.
2. Provide a new storage reservoir within the upper watershed to retain wet season flows for release during the dry season.
3. Establish a decision support system with basin models for development of basin management plans, including climate change impacts.
4. Establish a flood forecasting and early warning system for the Bagmati River Basin.
5. Provide capacity building of water users in efficient land and water management practices.