

**TC ABSTRACT
RG-T2343**

**REGIONAL SIMULATION MODEL OF WATER RESOURCES AND CLIMATE FOR LATIN AMERICA AND THE
CARIBBEAN (Hydro-BID): PRACTICAL APPLICATIONS**

I. Basic project data

- Country/Region: REGIONAL
- TC Name: REGIONAL SIMULATION OF WATER RESOURCES AND CLIMATE FOR LATIN AMERICA AND THE CARIBBEAN (Hydro-BID)
- TC Number: RG-T2343
- Team Leader: Fernando Miralles-Wilhelm (INE/WSA); Team Members: Raúl Muñoz and Irene Cartin (INE/WSA); Guillermo Eschoyez (LEG/SGO); Maricarmen Esquivel (INE/CCS); Jorge Ducci and Efrain Rueda (INE/WSA)
- Indicate if: KNOWLEDGE GENERATION AND DISSEMINATION
- If Operational Support, TC give number and name of Operation Supported by the TC: N/A
- Reference to Request¹: N/A
- Date of TC Abstract: 30 APRIL 2013
- Beneficiary (countries or entities which are the recipient of the technical assistance): REGIONAL
- Executing Agency and contact name: BANK EXECUTED
- IDB Funding Requested: 1,000,000 USD (AQUAFUND MULTIDONOR)
- Local counterpart funding, if any: NONE
- Disbursement period (which includes execution period): 24 Months
- Required start date: DECEMBER 2013
- Types of consultants (firm or individual consultants): FIRM AND INDIVIDUAL CONSULTANTS
- Prepared by Unit: INE/WSA
- Unit of Disbursement Responsibility: INE/WSA
- Included in Country Strategy (y/n): N/A; TC included in CPD (y/n): N/A
- GCI-9 Sector Priority: CLIMATE CHANGE AND ENVIRONMENTAL SUSTAINABILITY
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II. Objective and Justification

Assessing the potential for future changes in water availability is an important step for ensuring that infrastructure projects meet their operational, financial and economic goals. It is also important to examine the implications of such projects for the future allocation of available water among competing users and uses, to mitigate potential conflict and ensure such projects are consistent with long-term regional development plans and preservation of essential ecosystem services.

As part of its commitment to help member countries adapt to climate change, the IDB is sponsoring work to develop and apply an integrated suite of watershed modeling tools. The modeling system includes hydrology and climate analysis modules to estimate the availability (volumes and fluxes) of freshwater at the regional, basin and sub-basin scales. It will also include economic analysis and decision support tools to estimate the costs and benefits of adaptive measures and help decision

makers make informed choices among alternative designs for infrastructure projects and alternative policies for water resources management.

Phase I of this effort produced a working version of the Regional Hydrologic Model for Latin America and the Caribbean (Hydro-BID). The Hydro-BID system currently includes:

- an Analytical Hydrography Dataset (AHD) representing over 229,000 catchments in the LAC region and their corresponding river and stream segments;
- a GIS-based navigation tool to browse AHD catchments and streams with the capability of navigating upstream and downstream;
- a user interface for specifying the area and time period to be modeled and the location at which water availability will be modeled;
- a climate data interface to obtain rainfall and temperature inputs for the area and period of interest;
- a rainfall-runoff model based on the Generalize Watershed Loading Factor model; and
- a routing scheme for quantifying time of travel and accumulating flow estimates across downstream catchments.

Hydro-BID generates output in the form of an hourly time series of flow estimates for the selected location and period. In Phase I, the development team prepared a case study addressing water allocation issues in the Rio Grande Basin in Argentina, as an illustration of the simulation modeling system's inputs, operation and outputs. The initial version of Hydro-BID has been received enthusiastically in presentations to potential users and constituents in the IDB and to outside technical audiences via conferences and workshops, and there are several requests for parameterization of the model and practical applications from strategic Bank's clients within the Water Resources Sector in LAC.

Given this high level of demand, the general objective of this TC for the Phase II of the Model is to assist the Bank and its member countries in developing infrastructure projects and sectoral policies that will be resilient to anticipated changes in water availability, and to support development of water resource management plans at the basin, national and regional scales, including plans for transboundary waters.

To this end, the specific objectives of this TC project are the following:

- Solidify the institutional support of the Hydro-BID simulation system for the Bank staff and clients through the region, through the establishment of a technical support center.
- Deepen the capabilities of Hydro-BID through the development of new simulation modules and data sources
- Provide detailed implementation examples of the Hydro-BID simulation system in Bank project applications, specifically in loan operations in the water sector.

III. Description of Activities

The project will support the development of methodologies and outputs consisting of the following three activities:

- Establish and Operate the Technical Support Center (TSC): It will consist on the design, creation and maintenance of a TSC website from which users can access the AHD, Hydro-BID

software, decision-support tools, and associated data and information products. The website will be accessible through a portal on the IDB website. The website will have a public access area for general information and secure access areas for authorized users.

- **Develop Hydro-BID Applications and Supporting Data:** A key objective of this project is to enhance the data input and graphic display capabilities of Hydro-BID, add new components for economic analysis and specialized technical modeling, and adapt Hydro-BID output for use with other “external” models such as WEAP² and MIKE³. Developing new capabilities may require creating new software or programming interfaces through which Hydro-BID will interact with existing software. This activity will include the development of the following Hydro-BID enhancements: i) project specific hydrological analysis; ii) general and project-specific economic analysis modules (i.e., water demand, water allocation modeling, project-specific Cost/Benefit and Economic Impact Analysis); iii) graphic and map-based presentation of results and summary statistics; iv) enhancement of the Hydro-BID Capabilities; v) institutional and decision mapping; vi) climate data interface; and vii) user interface.
- **Apply Hydro-BID in Support of Infrastructure Projects and Water Resource Planning:** It will consist of the application of the Hydro-BID to perform hydro-climate analyses to support design, appraisal, risk assessment and evaluation of IDB loan projects in the agriculture, energy, water supply, ecosystem services and transportation sectors. It will also include the support of the development of comprehensive watershed management plans at the basin, country or regional scales. These services will be available to IDB sector divisions, country departments and country offices and to IDB member countries.

These activities are further detailed in the TC Document for this operation.

IV. Budget

This subheading should state the total amount of funding needed, showing allocations for each component as per the table below.

Indicative Budget (Detailed Budget: IDBDOCS #)	
Activity	Total Funding (SGTF)
Establish and Operate the Technical Support Center.	250,000
Develop HYDRO-BID Applications.	450,000
Apply HYDRO-BID in Support of IDB Projects and Decisions	300,000
TOTAL	US\$ 1,000,000

V. Executing agency and execution structure

This is a Bank-originated TC focused on refining and improving the new brand Regional Simulation Model of Water Resources and Climate for LAC and with the purpose of attending the high level of demand generated by the Model by practical applications for water resources management in different Bank member countries and regions. In addition, these model applications will add value by offering the opportunity of mainstreaming Climate Change impacts in the design of water resources planning and Bank’s infrastructure operations in different sectors (Water Supply, Water Resources Management, Hydro-energy, Irrigation, Natural Hazards and Risk Management and Transport). Besides the water

² WEAP: Water Evaluation and Planning, Stockholm Environment Institute, <http://weap21.org>.

³ MIKE: MIKE by DHI, Software for water environments, <http://dhisoftware.com>.

resources management and planning uses of the Hydro-BID, the tool will serve as supporting tool for the Environmental evaluation and screening of Bank's project loans at regional scale. The execution of this TC will provide a learning, knowledge transfer and data gathering opportunity for Bank staff involved in issues of water resources, vulnerability and adaptation to climate change, which is a new area of work that the Bank (and particularly the WSA division) has engaged in recently. Therefore, it is deemed critical that this TC is Bank-executed. The Bank will contract all consulting services (firms and individual) according to current corporate acquisitions policies and procedures.

VI. Project Risks and Issues

The primary risk for implementation of this TC project is the lack of technical capacity of some of Bank's clients and the gap of information for model parameterization in particular areas. To mitigate this risk, the TC includes the creation of the Technical Support Center (TSC) with the objectives, among others, of providing technical support and guidance to Hydro-BID users and supporting in data analysis and collection. An additional risk stems from the pioneering nature of this TC; there isn't much operational experience with the kinds of products that climate services will yield. We have therefore included peer review of all outputs of this TC by at least 2 anonymous reviewers (one within the Bank and one outside the Bank) to insure quality of the TC deliverables.

VII. Environmental and Social Classification

Following ESG's project classification process (Safeguard Policy Filter and Safeguard Screening Form) requirements, it has been determined that this project falls under Category C. No environmental assessment studies or consultations are required for Category "C" operations.