PROJECT INFORMATION DOCUMENT (PID)
CONCEPT STAGE

Report No.: PIDC17560

Project Name	IN Hydrology III Project (P152698)
Region	SOUTH ASIA
Country	India
Sector(s)	General information and communications sector (40%), Irrigation and drainage (20%), Public administration- Water, sanitation and flo od protection (15%), Flood protection (15%), General agriculture, fishing and forestry sector (10%)
Theme(s)	Water resource management (80%), e-Government (20%)
Lending Instrument	Investment Project Financing
Project ID	P152698
Borrower(s)	Ministry of Finance, DEA
Implementing Agency	Ministry of Water Resources, River Development and Ganga Rejuvenation
Environmental Category	B-Partial Assessment
Date PID Prepared/ Updated	22-Dec-2014
Date PID Approved/ Disclosed	01-Jan-2015
Estimated Date of Appraisal Completion	14-Aug-2015
Estimated Date of Board Approval	30-Sep-2015
Concept Review Decision	Track II - The review did authorize the preparation to continue

I. Introduction and Context

Country Context

India is the World's tenth largest economy and represents around 2.5% of the global GDP. In spite of some slow-down in growth in the last few years, it remains one of the ten fastest growing economies in the world and economic growth is projected to accelerate over the coming years. Similarly, India has made great progress in reducing poverty in recent decades, and yet over 400 million people remain in poverty in India – over one third of the global poor.

Initially it was massive investments in water resources infrastructure over 150 years that eliminated famine and fueled broad-based development across India. India's agricultural revolution transformed the nation from chronic dependence on food imports into a nation that is not only self-sufficient in food but also now a major exporter of agriculture produce (over US$44 billion per year). However, the economic growth of recent decades has been driven by a rapid rise in the

industrial and services sectors with a decline in the relative economic contribution of agriculture.

In spite of rapid urbanization and industrial growth, 65% of the Indian population is rural and agrarian and depends directly on agriculture for their livelihoods. With a total population of one and quarter billion people, a high population growth rate and major water-related risks from a changing climate, ensuring future food security remains a major national challenge.
Water availability, both spatially and temporally, is increasingly becoming a constraint to economic growth. Five out of twenty major river basins have been closed to any further development. In those basins with surplus water, there are sub-basins where both surface and groundwater are over exploited. Irrigation represents 85% of total national water use, and the mechanisms for re-allocating water from irrigation to other sectors are slow, inefficient and politically charged.
Several national water resource assessments and projections have been undertaken in recent decades. All differ somewhat (a reflection of inadequate data and limited capacity for robust analysis), but all indicate a doubling or tripling of non-agricultural demands, and totals demands that will outstrip available supply by as soon as 2030. These are all supply-demand assessments for an “average” year, and in country with huge seasonal and inter-annual variations in flow and the capacity to store only 15% of the mean annual flow, the future without intervention is one of rapid reductions in water security.

To address this challenge will require multiple investments and other interventions. Fundamental to all however, will be vastly improved strategic water resources planning on a river basin scale to guide investments and to enable improved water resources management. Both improved planning and management are only possible with a sound basis of data and information describing the extent, variability and quality of the water resource, together with modern tools and the capacity for water resources modelling and analysis. These require institutional strengthening and the training of professional staff in water agencies in all states and centrally. Currently across India water data, modelling expertise, and the technical and institutional capacity for good water resources planning and management are all grossly inadequate.
Ultimately, better water resources planning and management will enable a modernization of irrigation to ensure food security for a growing population while enabling both water and labor to be re-allocated to support the industrial and services sectors that are the engine room of the rapidly growing Indian economy.

Sectoral and Institutional Context

Water resources are managed by both central and state governments. The Government of India (GoI) has created a supportive institutional and policy environment with water resources management as a major agenda in its development strategies. The Ministry of Water Resources, River Development & Ganga Rejuvenation (MoWR, RD&GR) is the apex body responsible for the development and management of India’s water resources of the country, with the Central Water Commission (CWC), and Central Groundwater Board (CGWB) as key technical organizations. MoWR, RD&GR formulates legislation, policies, strategies and operational guidelines for the development and management of water resources. These include the National Water Policy, the National Hydro-meteorological Data Dissemination Policy, and the relevant sections of the Twelfth Five Year Plan. CWC, CGWB and the Central Pollution Control Board (CPCB; administered by Ministry of Environment, Forests and Climate Change) are responsible for monitoring at the macro and interstate levels for surface water, groundwater and water quality, respectively.

Since most aspects of water management are state responsibilities under the National Constitution,

state agencies play a major role in the preparation and implementation of development projects relating to flood protection and flood forecasting, irrigation and drainage, water supply, monitoring drinking water, and the collection of hydro-meteorological data. In most states these roles spread across multiple agencies and coordination and data sharing amongst them is poor. The agencies with primary role of hydro-met monitoring include irrigation/water resources departments, groundwater departments, drinking and water supply (water quality) and, in some cases, central and river basin organizations. River basin organizations are responsible for monitoring rivers and reservoirs under their jurisdiction, as well as reservoir
operation, and flood control and hydropower generation.

Flood management is a sphere where there is strong political commitment at all levels, and over a period of time this need for managing the impacts of flood has provided a basis for discourse on appropriate and adequate information systems. However, differences over roles, responsibilities and jurisdictions on water resources management including information management had remained an issue in India, as water is a subject within the jurisdiction of the states, and where the central government is unable to lead unless all states agree. Although states are realizing that an inclusive river basin approach involving all occupying states within a multistate river basin is required for critical actions such as flood management and impact of water resources development, there are contentious issues of water allocation and rights. These disputes often overshadow the need for appropriate information systems. Further, in the international basins (Ganges, Indus and Brahmaputra basins) water information is classified.

While most aspects of water management are state responsibilities, it is being increasingly recognized that an inclusive multi-state, river basin, approach is required for critical actions such as flood management and the mitigation of water resources development impacts. In 2013 MoWR, RD&GR introduced a National Hydro-meteorological Data Dissemination Policy to facilitate the exchange of data and information between agencies. This policy entitles any web-registered user to freely download all unclassified hydro-meteorological data hosted on the India-WRIS website. Implementation of this policy will be strengthened by the new GOI “Digital India” initiative that aims to connect government departments and citizens for effective governance.

The World Bank funded Hydrology Project Phase I (HP1, 1996-2003) and Phase II (HPII, 2006-2014), implemented by the then Ministry of Water Resources, helped India’s southern (Peninsular) states, Himachal Pradesh and Punjab, to build a comprehensive Hydrological information system (HIS), and to standardize databases and decisions support systems for river basin operation, planning and management. HIS or Water resources information system (WRIS) is an integrat ed system for reliable, comprehensive and timely hydrological and meteorological data. It consists of scientific hydrological and meteorological observation networks for both surface and groundwater data (quantity and quality); data processing and data storage facilities; reliable data communication arrangements; and trained manpower for operations and user support. During HP1, the project supported developing comprehensive HIS in Southern India (9 states) and aimed at developing the culture of Hydro-meteorological monitoring in the country and then standardizing the database and monitoring system across the project states. During HPII, the project enabled a paradigm shift in hydro-informatics and operational water management, moving from manual monitoring to automatic real-time monitoring and transmission, from limited accessibility to wide data sharing, and from simplistic operational management of water resources infrastructure, to more sophisticated and effective operation management of key reservoirs. The project has supported establishment of Hydrology data centers and modernization of practices in design, operation and

planning units of various water resources departments. The state departments have been transformed to use river basin approach and design the structures using modern tools and softwares. Some state departments are responsible to approve new projects proposed for investments and suggest cost effective investments.

HP-II was instrumental in promoting real-time hydro-met systems – introduced mid-way through the project. Given the novelty of the technology there was no experience within implementing agencies and hence adoption was limited to selected locations. The real-time monitoring and decision support systems for reservoir operation and for water management proved to be very effective in reducing flood damages and improving water resources management. Based on this success, demand for these novel technologies has grown from both HP-II and new HP-III agencies. Additionally, and critically, monitoring systems need to be extended to include irrigation canals which account for 85% of total water use in India.

Relationship to CAS

The project aligns with the Bank's Country Partnership Strategy 2013-2017 along its second pillar – Transformation. The project will contribute to improved water and natural resources planning and management at national and state levels. In particular, the project will underpin improved inter-sectoral water allocation to enable the growing demands for water in the urban and industrial sectors to be met while increasing agricultural water use efficiency. Industry is the engine of economic growth in India, while agriculture contributes a dwindling proportion of GDP. Increasing irrigation water use efficiency through better measurement and management will be critical to increasing agricultural productivity and hence food security for a growing population, in the face of competing demands for water. (Increased water use efficiency will require a combination of significant technological and institutional improvements.) Inter-sectoral re-allocation of water and increased efficiency of use are critical to growth and poverty alleviation, as agriculture is still the dominant employment sector in India but is a rapidly shrinking relative contributor to GDP. These reforms will enable a movement of labor from subsistence and low-wage agriculture to meet growing demands in the manufacturing and services sectors. Additionally, the project will improve flood management to reduce flood risk. The impacts of floods are traditionally felt most by the poorest and most vulnerable people in India, including through damage to crop lands and other property and transmission of water-borne diseases. Without interventions, including the effort of this project, these impacts are expected to grow significantly with climate change. The project is thus fundamental to supporting the India's rapid rural-urban transformation in ways that ensure poverty alleviation and shared prosperity.

II. Proposed Development Objective(s)

Proposed Development Objective(s) (From PCN)

The proposed PDO is to "to strengthen water resources planning and management in selected institutions across India through improved monitoring and enhanced accessibility and use of water resources data and information"

Key Results (From PCN)

Proposed PDO outcome indicators are:

1. Volume of data stored and accessible online through the National WRIS
2. Number of states uploading and accessing data through the National WRIS
3. Number of registered users of National WRIS and volume of data downloads
4. Number of basins with improved flood management information systems

5. Number of basins with DSS including appropriate analytical tools for Water Resources management

III. Preliminary Description

Concept Description

Description

Based on the successes of previous phases of project, the GoI wishes to expand these efforts to cover the entire country including the states of the Indus, Ganga and Brahmaputra basins . HP-III will further improve and expand monitoring systems for water availability and water use. It will emphasize real-time monitoring for operations, flow forecasting, integrated water resource planning on a river basin basis and strengthening of community-based groundwater management. HP-III will contribute to the GoI Digital India initiative by integrating across state and central agencies.

Building on the earlier phases, HP-III will include the following:

i. Database standardization: a national information center and center of excellence will be established to standardize databases and associated procedures and to integrate hydro-meteorological and water use data of the country.

ii. Transparent and reliable water data: real-time and automated monitoring with online delivery for reliable and transparent data access in support of operational management.

iii. Balanced centralized and decentralized support: the project will provide both generic national solutions (through central agencies) and specific state-based solutions.

iv. Operational systems: state-level operational systems will be put in place for flood management and irrigation distribution.

v. River basin approach: IWRM on a river basin basis will be promoted to devise appropriate solutions for planning investments and developments.

vi. Flexible design: the project will support performance based funding allocations and flexibility in program to address the needs of states.

vii. Cross learning: cross-learning among states will be continued including transferring knowledge from HP-II state agencies to new HP-III agencies.

The project will consist of the following four components:

Component A: Improving In Situ Monitoring System (IMS): USD 300 million.

This component will expand and upgrade water resources monitoring systems, bolster database population and maintenance, develop community-based data collection and water management, and conduct site specific surveys to the states in the Indus, Ganges and Brahmaputra Basins and in North-East India. This will include:

i) In situ real time/automated monitoring systems (weather, river, reservoir, canal, groundwater and water quality) ;

ii) Community-based hydrological monitoring and management system;

iii) Implementation of protocols developed by central agencies (CWC, CGWB and CPCB) for inter-agency data sharing, data validation and analytical quality control procedures for water quality laboratories;

iv) Establishment of National Water Information Center though upgrading and expansion of database software on web-based centralized systems for data entry, data storage, data management and data dissemination, developed under HP-II (including India-WRIS); and

v) Targeted surveys such as i) priority reservoir sedimentation surveys, ii) bathymetric surveys in river stretches with critical flooding issues, iii) groundwater exploration and aquifer mapping for

selected areas, and iv) water quality and waste load surveys, to assess the load, fate and transport of critical constituents within water quality hotspots.
The output of this component would be a national Water Resources Monitoring System.

Component B: Improving Spatial Information System (SIS): USD 80 million

The component will strengthen and make available remote sensing and spatial information data to water managers and stakeholders through providing and processing of spatial data sets, creating tools for tailor-made processing of spatial data, and developing web-based portals for public access to information. Development of centralized spatial data sets will largely be produced by National Remotes Sensing Center (NRSC), Indian Meteorological Department (IMD) and Survey of India (SOI) with the dissemination of the information via a publicly accessible, web-based portal for non-classified data. Products to be developed include:
i) Digital Elevation Model (DEM) for the entire country for improved flood hazard mapping and other planning purposes,
ii) Local high resolution surveys (such as LIDAR) for flood prone areas to support flood risk mapping and management action plans,
iii) Satellite based estimates of water balance parameters including climate, land use, irrigation water requirement, and flood assessment
iv)Publicly accessible, web-based portal for non-classified data.
The output of this component will be centralized Water Resources Information System (WRIS) customized with respect to various users including public, state agencies and other departments.

Component C: Promoting Water Resources Operation and Management Applications (WROMA): USD 50 million
This component will ensure the usefulness of the WRMS and WRIS data sets through decision support systems (DSS) for river basin planning, water balance assessments, climate risk assessments, water quality management, scenario analysis for investment planning, and tools for community based groundwater management. It will develop short-term and seasonal flow forecasts, establish multiple flood/flow forecasting systems important for operation of reservoirs and flood management, and introduce on pilot basis operation and water distribution systems for irrigation systems. Flagship knowledge products will include IWRM plans for selected river basins, a report on the status of India's water resources, including water balance assessments, water quality assessments and support purpose driven studies (PDS) on specific issues for each IA, including climate risk assessments for present and planned water resources infrastructure.

Component D: Strengthening Water Resources Institutions and Capacity Building (WRICB): USD 70 million
The Component will strengthen and build capacity in the participating Implementing Agencies (Water Resources Institutions) through establishing Water Resources Knowledge Centers and providing infrastructure and communication equipment, capacity building and extensive training programs, supporting project management through Technical Assistance and Management Consultancies, and funding of incremental staff. In particular, the project will support the establishment of a National Water Information Center (upgraded version of India-WRIS) and centers of excellence at national and state levels. The National Water Information Center will provide a central platform for integration and exchange of water data across the country and will ensure the sustainability of data management. MoWR, RD&GR established India-WRIS with its own resources and they are now committed to the National Water Information Center following the

achievements of HP-II. In addition, the project will support strengthening of irrigation training Institutes for improved water management practices.

IV. Safeguard Policies that might apply

Safeguard Policies Triggered by the Project	Yes	No	TBD
Environmental Assessment OP/BP 4.01	×		
Natural Habitats OP/BP 4.04		×	
Forests OP/BP 4.36		×	
Pest Management OP 4.09		×	
Physical Cultural Resources OP/BP 4.11		×	
Indigenous Peoples OP/BP 4.10	×		
Involuntary Resettlement OP/BP 4.12			×
Safety of Dams OP/BP 4.37		×	
Projects on International Waterways OP/BP 7.50			×
Projects in Disputed Areas OP/BP 7.60		×	

V. Financing (in USD Million)

Total Project Cost:	500.00	Total Bank Financing:	370.00
Financing Gap:	0.00		

Financing Source	Amount
BORROWER/RECIPIENT	130.00
International Development Association (IDA)	370.00
Total	500.00

VI. Contact point

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