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The World Bank

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Report No: 28140-IN

PROJECT APPRAISAL DOCUMENT

ON A

PROPOSED LOAN

IN THE AMOUNT OF US$ 105.51 MILLION

TO THE REPUBLIC OF INDIA

FOR A

HYDROLOGY PROJECT PHASE II
(HP II)

July 19, 2004

Agriculture and Rural Development Sector
South Asia Regional Office

CURRENCY EQUIVALENTS

(Exchange Rate Effective March 4)

Currency Unit = Indian Rupees
Rs. 45.0 = US$1

FISCAL YEAR
April 1 – March 31

ABBREVIATIONS AND ACRONYMS

ASCI	Administrative Staff College of India
BBMB	Bakhra-Beas Management Board
CAS	Country Assistance Strategy
CGWB	Central Ground Water Board
CPAR	Country Procurement Assessment Review
CPCB	Central Pollution Control Board
CWAS	Corporate Water Sector Strategy
CWC	Central Water Commission
CWPRS	Central Water and Power Research Station
DSS	Decision Support Systems
DFD	Dedicated Finance Desk
EIC	Engineer in Chief
GOI	Government of India
GW	Ground Water
GW&MI	Ground Water and Minor Irrigation
HDUG	Hydrologic Data User Groups
HIS	Hydrological Information System
HISCS	Hydrological Information System Coordination Secretariat
HISMG	Hydrological Information System Management Groups
HP I	Hydrology Project (completed in December 2003)
HP II	Hydrology Project Phase II
IA	Implementing Agency
ICR	Implementation Completion Report
IC	Individual Consultant
ICB	International Competitive Bidding
IMD	India Meteorological Department
IT	Information Technology
IWRM	Integrated Water Resources Management
MDG	Millennium Development Goals
MIS	Management Information System
MTR	Mid-Term Review
MOWR	Ministry of Water Resources
NCB	National Competitive Bidding
NCC	National Coordination Committee
NGO	Non Governmental Organization
NHTC	National Hydrology Training Committee
NIH	National Institute of Hydrology
NLSC	National Level Steering Committee
NWP	National Water Policy
NWS	National Weather Service
O&M	Operation and Maintenance
PCS	Project Coordinating Secretariat
PDO	Project Development Objective
QCBS	Quality and Cost Base Selection
SHISCC	State Hydrological Information System Coordination Committee
SIL	Specific Investment Loan
SLSC	State Level Steering Committee
USBR	United States Bureau of Reclamation
USGS	United States Geological Service
SW	Surface Water
WQ	Water Quality

Vice President:	Praful C. Patel
Country Director:	Michael F. Carter
Sector Director/Manager:	Constance Bernard/Gajanand Pathmanathan
Task Team Leader:	E.V. Jagannathan

INDIA
HYDROLOGY PROJECT PHASE II (HP II)

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Map(s): IBRD No. 33059

INDIA

HYDROLOGY PROJECT - PHASE II

PROJECT APPRAISAL DOCUMENT

SOUTH ASIA

SASAR

Date: July 19, 2004
Country Director: Michael F. Carter

Sector Manger/Director: Gajanand Pathmanathan/Constance Bernard

Project ID: P084632

Lending Instrument: Specific Investment Loan

Team Leader: E. V. Jagannathan
Sectors: Agriculture, Fishery and Forestry (Irrigation and drainage) (100%)

Themes: Environment and Natural Resource Management (Water resource management) (P)
Environmental screening category: C

Safeguard screening category: S3

Project Financing Data

[X] Loan [ ] Credit [ ] Grant [ ] Guarantee [ ] Other:

For Loans/Credits/Others:

Total Bank financing (US$ m.): US$105.51 million

Proposed terms: Standard IBRD Loan Terms

Financing Plan (US$m)

Source	Local	Foreign	Total
BORROWER	29.27	0.27	29.54
IBRD	72.76	32.75	105.51
OTHERS	0.00	0.00	0.0
Total:	102.03	33.02	135.05

Borrower:
Government of India (Central agencies and Project States)

Responsible Agency:
Ministry of Water Resources, Government of India, Shram Shakti Bhawan, Rafi Marg, New Delhi: 110001. Tel. # 91-11-24694752

Estimated disbursements (Bank FY/US$m)

FY	2005	2006	2007	2008	2009	2010	2011		
Annual	5.73	21.43	28.05	23.01	14.75	8.32	4.22		
Cumulative	5.73	27.16	55.21	78.22	92.97	101.29	105.51		

Project implementation period: Start: September 1, 2004 End: August 31, 2010 (6 years)
Expected effectiveness date: November 30, 2004
Expected closing date: February 28 , 2011

Does the project depart from the CAS in content or other significant respects? ***Ref. PAD A.3***	[ ]Yes [x] No
Does the project require any exceptions from Bank policies? ***Ref. PAD D.7*** Have these been approved by Bank management? Is approval for any policy exception sought from the Board?	 [ ]Yes [x] No [ ]Yes [ ] No [ ]Yes [ ] No
Does the project include any critical risks rated "substantial" or "high"? ***Ref. PAD C.5***	[ ]Yes [x] No
Does the project meet the Regional criteria for readiness for implementation? ***Ref. PAD D.7***	[x]Yes [ ] No

Project development objective ***Ref. PAD B.2, Technical Annex 3***
The Project Development Objective (PDO) will be to extend and promote the sustained and effective use of the HIS by all potential users concerned with water resources planning and management, both public and private, thereby contributing to improved productivity and cost-effectiveness of water-related investments in the 13 States and eight Central agencies

Project description *[one-sentence summary of each component]* ***Ref. PAD B.3, Technical Annex 4***
The project has three main components:

1. **Institutional strengthening**:
   a. Consolidation of recently concluded Hydrology Project (HP I) activities in the existing States.
   b. Awareness raising, dissemination and knowledge sharing.
   c. Implementation support.

2. **Vertical Extension**:
   a. Development of hydrological design aids.
   b. Development of decision support systems.
   c. Implementation of purpose-driven studies.

3. **Horizontal Expansion**:
   a. Upgrading/establishment of data collection network.
   b. Establishment of data processing and management systems.
   c. Purpose-driven studies.
   d. Training

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Which safeguard policies are triggered, if any? ***Ref. PAD D.6, Technical Annex 10***
Environmental Assessment OP/BP/GP 4.01

Significant, non-standard conditions, **if any**, for:
Ref. PAD C.7
Board presentation: None

Loan/credit effectiveness: None

Covenants applicable to project implementation:

1. The Borrower shall engage, (a) not later than March 31, 2005, a Management Support Consultant and an Implementation Support Consultant to assist in the implementation of the Project; (b) not later than March 31, 2005, Decision Support System (DSS) Planning Consultants; and (c) not later than June 30, 2005, DSS Real Time Operational Management Consultants, and Design Aid Consultants; all such consultants to assist in the carrying out of Part B and C of the Project.

2. The Borrower shall undertake in collaboration with the Project States and the Bank, not later than October 31 of each year, starting October 2005 an annual review of the Project, and not later than June 30, 2006 and June 30, 2008 two mid-term reviews of the Project, and shall incorporate the findings of such review in the work programs.

3. The Borrower shall furnish to the Bank for the Bank's review and comments not later than December 31 of each year, starting December 31, 2004, work program, cost estimates, and budget proposals for Parts B and C of the Project for the following fiscal year.

4. To assist in the management and dissemination of hydrological data generated through the Project, the Borrower shall modify, not later than June 30, 2005, hydrology data user groups with membership and terms of reference (TOR) agreed with the Bank.

5. The Borrower shall establish, in collaboration with the Project States and the Bank, and not later than December 31, 2007 computerized financial management in one of the two selected Project States, such Project States to be identified by June 30, 2005, and not later than December 31, 2008 on the other selected Project State.

A. STRATEGIC CONTEXT AND RATIONALE

1. Country and sector issues

A.1.1 Management of India's water resources poses a major developmental challenge. Since independence fifty seven years ago (population: 360 million; food grain production: 51 million tons), massive investment in infrastructure has virtually eliminated the threat of famine and fueled broad-based development. Although the majority of the country's population still remains rural[1] and agrarian, substantial urbanization (28% of current population lives in urban areas) and industrial growth (26% of the gross domestic product) are taking place. The availability of fresh water, both spatially and temporally, has become a major factor constraining the ability of the water supply, industrial and agriculture sub-sectors to meet the diversified needs of a growing population. In large areas in the country, the available fresh water resources are reducing on per capita basis; groundwater levels are falling and the water quality is deteriorating. These stresses on water availability and quality have led to competing demands and disputes among users including State governments.

A.1.2 Issues of water quality and scarcity and the need for control of and protection from such natural disasters as floods and droughts are increasing in importance, particularly in the way that such occurrences have a major disproportionate impact on the livelihoods of the poor. As a consequence, a paradigm shift is being made from relatively isolated water resource developments towards comprehensive planning, development and management of water resources in a river basin context. One of the key requirements for comprehensive water resources planning is a sound hydrological data base for use in modern planning and design tools (hydrologic modeling, decision support systems, hydrologic design aids, etc.). An inadequate/unreliable hydrological data base, associated with a lack of processing/ modeling capabilities at agency levels, has been a significant constraint in optimal designs and operations of projects in water sector. In these situations, the data base developed under the first Hydrology Project (HP-I)[2] which provides scientifically-verified, uniformly-acceptable and widely-accessible hydrological records covering all aspects of the hydrological cycle, is an essential pre-requisite for sound water resource planning and management.

A.1.3 The Hydrological Information System (HIS)[3] created under HP-I, including the hydrological data base together with the associated improved facilities, standardized procedures and agreed inter-agency protocol for data collection, collation, processing and exchange, has created a sound basis among all the implementing agencies (IAs) for moving towards improved planning and design of water resources development and long-term water resource management. The rigidities of data ownership and information-sharing in India are being addressed, and the ground has been laid for achieving the unrestricted and transparent data exchange and use in the future. Beginning has already been made in HP-I through creation of Hydrology Data User Groups (HDUGs), posting of the data catalogues in the web sites and with users paying for the demanded data. However, notwithstanding the improvements made under HP-I, the HIS continues to be deficient in terms of both geographic coverage and use of modern analytical tools and skilled manpower for hydrologic modeling and analyses, for both quantitative and qualitative data aspects.

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1 72% of an estimated total population of 1 billion - 2001 census.

2 India Hydrology Project - I, nine States and six Central agencies have been covered.

3 Hydrologic Information System (HIS) is an integrated water information system providing 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 storage facilities; reliable data communication arrangements; and trained manpower for HIS operations and user support.

A.1.4 The proposed follow-on Hydrology Project - Phase II (HP-II) will continue supporting the enhancement of a comprehensive HIS in India, expanding its coverage to four more States and two Central agencies[4], improving access and use by the private sector and civil society, and consolidating and intensifying its use in effective and efficient water resources planning and management. A longer-term aim of the project would be to assist the Governments at both Central and State levels to address the issues of intra-sectoral demands and overall resource planning and management through the establishment of core hydrological organizations serving all specialized water agencies. The outcome of having an easily accessible HIS and tools for development of decision support system in water sector planning and management in participating agencies would lead to improved overall program of integrated water resource management in India.

2. Rationale for Bank involvement

A.2.1 The establishment of an effective and sound hydrologic database and HIS, and the development of consistent and scientifically-based tools and design aids using such data would need global experience and knowledge. The Bank, through its long association with both Central and State governments in the water resources sector and with similar situations in other countries, has a particularly strong comparative advantage in supporting such measures: it can draw upon relevant experience from other countries, has a comprehensive view of the sector's overall development and provides a major role in defining a strategic focus for the country's long-term water management strategy. Being a capable partner in developing and promoting the HIS completed under HP-I, Bank involvement would continue to be essential and crucial in addressing the above-mentioned key deficiencies.

A.2.2 Prior to the mid-1990s, the Bank's engagement in India had not fully appreciated the importance of a sound hydrological data base in the form of the HIS. Until then, its operations had primarily focused on investments in the rehabilitation and renovation of water control infrastructure and associated institutional and policy reforms, without addressing first the basic issue of data soundness for resources' assessment and management. This had often resulted in projects experiencing increased costs and their outcomes being less than expected. For example, unreliable and inadequate hydrological data and consequent analyses have resulted in less-than-optimal benefits and, sometimes, unsafe control structures as observed in some Bank funded projects, e.g. the design of the command area from the multi-State Subarnarekha Irrigation Project; and undersized spillways in dam and reservoir projects.

A.2.3 The proposed HP-II project would, therefore, taking on from the development of HIS under HP-I, lay the foundation to ensure that all future water sector activities, including Bank-funded programs, will be developed on the basis of a robust hydrological data base and using – to the extent possible – sound, analytical, HIS data-based decision support tools, design aids and methodologies for planning, design, operation and management. The overall impact of the project would be to help India acquire tools, systems and standardized procedures to manage inter-sectoral water demands more efficiently and equitably – of major benefit to the most vulnerable strata of society – as well as to plan for and manage extreme hydrologic events such as floods and droughts.

3. Higher level objectives to which the project contributes

A.3. India has already adopted a *National Water Policy (NWP) (2002)* establishing the policy[5], legal and institutional arrangements for comprehensive and integrated planning, development and management of its water resources. The Policy clearly identifies the need for institutionalized arrangements to

[4] The new States are Goa, Himachal Pradesh, Pondicherry, and Punjab. The two Central agencies are Central Pollution Control Board (CPCB) and Bhakra- Beas Management Board (BBMB).

[5] India National Water Policy (2002) , Articles 2.1 and 2.3.

maintain a robust and transparent hydrologic data base, including appropriate training, as a prime requisite for surface and groundwater resource planning in basins and sub-basins. The use of such data would support the strategy of evolving towards water allocation criteria based on reliable hydrological analyses and contribute to consistent and scientifically-based decisions. The project is consistent with the Bank Group Country Assistance Strategy (CAS) discussed at the Executive Directors on December 5, 2002. The CAS[6] for India reflects a major concern about the need for water resources planning, allocation and management, and regulation. The project would, therefore, respond both to the CAS and to India's NWP. It would also complement the supply side approach with Bank's current engagement on demand side management in India's water sector. Finally, it would also be an important instrument for the application of the Bank's *Corporate Water Sector Strategy (CWAS)* that promotes optimal water resources development and integrated water resources management.

B. PROJECT DESCRIPTION

1. Lending instrument

B.1. After examining various options, the Specific Investment Loan (SIL) was considered the most appropriate lending instrument as it was used for HP-I (funded in HP-I through 100 percent IDA credit) and would be the most suitable approach for the proposed HP-II. The project is largely an institutional strengthening and knowledge management activity, being of a scientific and innovative nature, and would be implemented over a period of six years following a process approach, with detailed planning of annual work program and related procurement determined on the basis of results. It is proposed to structure the project into three two-year phases, with mid-term reviews at the end of each two-year phase. Thus, the project should be seen as part of a program approach, involving a series of project-based interventions, which move from creation of a sound hydrological data base to supporting the use of integrated water resources management.

2. Project development objective and key indicators

B.2.1 The Project Development Objective (PDO) will be to extend and promote the sustained and effective use of the HIS by all potential users concerned with water resources planning and management, both public and private, thereby contributing to improved productivity and cost-effectiveness of water-related investments in the 13 States and eight Central agencies[7]. The coverage of existing States under the project is to help these agencies from moving over from development of HIS (as in HP-I) towards use of HIS in water resources planning and management. The PDO will be achieved by: (a) strengthening the capacity of hydrology departments (surface and groundwater) to develop and sustain the use of the HIS for hydrological designs and decision tools thus creating enabling environment for improved integrated water resources planning and management; (b) improving the capabilities of implementing agencies at State/Central level in using HIS for efficient water resource planning and management reducing vulnerability to floods and droughts and thereby meeting the country's poverty reduction objectives; (c) establishing and enhancing user-friendly, demand responsive and easily accessible HIS to improve shared vision and transparency of HIS between all users; and (d) improving access to the HIS by public agencies, civil society organizations and the private sector through awareness building supporting outreach services. Greater use of an improved HIS is expected to have a broad but definite impact on the planning and design of water resources schemes, from which the rural and urban poor will have secure and

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6 CAS (2002). New CAS is under development

7 These are (i) States included in HP-I: Andhra Pradesh, Gujarat, Maharashtra, Karnataka, Kerala, Madhya Pradesh, Chattisgarh, Orissa, and Tamil Nadu; and (ii) new States: Himachal Pradesh, Goa, Pondicherry and Punjab, and (iii) Central Agencies: Ministry of Water Resources (MoWR); Central Water Commission (CWC), Central Groundwater Board (CGWB), National Institute of Hydrology (NIH), Central Water and Power Research Station (CWPRS), India Meteorological Department (IMD), CPCB, and BBMB.

sustainable access to water for multi-purpose livelihood uses. The conceptual framework of outcome and output indicators is outlined below. Specific measurable indicators will be developed by the project's Management Consultants in consultation with the participating agencies, during the design of the project monitoring system.

Outcomes/Impact	Outputs
i. Shared vision and HIS transparency between and among public and private institutions	i. Institutionalized process and procedures of hydrology and meteorology data collection, collation, validation, analysis and dissemination
ii. Improved water resources planning and management	ii. Improved data accessibility
iii. Improved management of floods and droughts	iii. Design aids, decision support systems and purpose-driven studies using HIS
iv. Increased public awareness on surface and groundwater quantity and quality	iv. Strengthened key water sector institutions and partnerships for HIS development and use
	v. Awareness and outreach campaigns

3. Project components

B.3.1 The project would consist of three main components: (a) **Institutional strengthening**, covering all 13 States and eight Central agencies; (b) **Vertical Extension**, covering the nine existing States and eight Central agencies including CPCB and BBMB; and (c) **Horizontal Expansion**, covering four new States.

B.3.2 **Component I - Institutional Strengthening** (US$49.38 million): This component would comprise of three sub-components, namely: (i) consolidation of HP-I activities in the existing States; (ii) awareness raising, dissemination and knowledge sharing; and (iii) implementation support. Under the consolidation of HP-I activities, the project would support the existing IAs with continued/extended training in HIS data processing and associated software, and full functionality and interface of Groundwater (GW) data processing and data storage software provided under HP-I and upgrade hydrometric equipment based on failures of some DWLRs, as well as training in the use of specialized water quality (WQ) equipment. The project would also finance improved data processing, spatial analysis and dissemination of standard and user-specified maps, together with related capacity building. The awareness raising, dissemination and knowledge sharing sub-component would provide for a management consultancy services to assist the HIS Coordinating Secretariat (HISCS)– previously the Project Coordinating Secretariat (PCS) - and the Dedicated Finance Desk (DFD) with the formulation of a strategy and detailed operational proposals for spreading awareness, dissemination and knowledge sharing among IAs and HIS users, and to train IA in these areas. Implementation support sub-component would include consultancies to assist the HISCS and State-level IAs, and logistical support and incremental recurrent costs, including incremental staff and operation and maintenance (O&M) costs.

B.3.3 **Component II - Vertical extension** (US$58.95 million): This component encompasses all those activities which would enhance the use of HIS and demonstrate real hydrological data applications for future replication. Sub-components include: (i) the development of hydrological design aids, (ii) the development of decision support systems; and (iii) implementation of purpose-driven studies. All sub-components would be supported by upgrading in remote sensing and Geological Information System (GIS) capacities and the provision of spatial data inputs and outputs and data visualization. The development of hydrological design aids in Surface Water (SW), GW and Water Quality (WQ) domains

would use HIS data for the creation/development of standardized hydrological design aids using well-established and internationally-acceptable methodologies. These design aids would not only facilitate and expedite hydrologic design but would also, for the first time, usher in a uniform approach to the hydrological assessment of both gauged and un-gauged catchments. This sub-component would be implemented by Central Water Commission (CWC) and Central Groundwater Board (CGWB), in conjunction with National Institute of Hydrology (NIH) and participating IAs, supported by various consultancies. The development of DSS, consisting of information systems linked to appropriate models, would also be supported to promote the use of the data generated under HIS. Two types of DSS would be included: (i) water resources planning and basic operational DSS for selected States and Central agencies. Areas that would be covered could include surface water planning, groundwater planning, reservoir operation, irrigation management, drought monitoring and analysis/management, conjunctive use of surface and ground waters, and water quality (e.g. for contaminant transport and waste-load allocation planning); and (ii) a real-time advanced operational DSS for Sutlej and Beas upstream basins[8] of BBMB. Planning DSS are intended to support decisions required at relatively infrequent time intervals, such as one week, 10 days, one month, or longer planning horizons, and are proposed for all nine HP-I States. The inclusion of new States would be considered at appropriate mid-term review (MTR), based on their performances in proposed horizontal extension. Real-time DSS for advanced operations are used to support operational decisions required at daily or shorter time intervals. They require sophisticated data acquisition systems and modeling technologies as well as technical support staff with advanced and specialized training. Given the high costs of the consultancies and information technology (IT) systems required, and the recommendations of the implementation completion reporting (ICR) mission with regard to the phasing of new technologies, the real-time DSS are proposed for two pilot basins: the Mahanadi basin (in the States of Chattisgarh and Orissa: details to be worked out later)- primarily for flood forecasting, and the Sutlej-Beas basin (under the jurisdiction of BBMB) for real-time operations. All the relevant IAs in the other States would be associated in the development and implementation of the real-time DSS. Lessons arising from these DSS would be used by all States to undertake similar activities.

B.3.4 The State and Central agencies have proposed a large number of studies (over 50), estimating their cost to some Rs. 1,200 million (i.e. some US$26.7 million, base cost[9]), as purpose-driven studies. These proposals are to be reviewed and revised in light of the following three criteria: (i) the study should be related to an identified issue in water management in the agency's area of operation; (ii) it should be related to specific issues of public concern in water management for which solutions are to be identified ; and (iii) future replication of the proposed study methodology is within the agency's jurisdiction, is feasible and cost-effective. The studies to be supported by the project's Studies Fund of about US$12.9 million (including contingencies)[10] would follow screening, review and approval by the HIS Management Group (Technical). This fund is of major importance, as purpose-driven studies will be the main activities directly implemented by HP-I agencies, other activities relying largely on external consultancies. Implementation progress would be assessed during the first MTR in year 3, and recommendations for further studies would be made on the basis of experience and achievements. Annex 4 gives the comparative characteristics and details of the above sub-components.

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[8] The inclusion of the Sutlej-Beas and Mahanadi basins is based on the following considerations: (a) existence of basin authority (BBMB); (b) provide demonstration of inter-state coordination; and (c) longer lead-time available for improved use of real-time information.

[9] This would account for some Rs 1300 million - i.e. US$28.9 million - base cost, if new States' proposals are included.

[10] Aggregated Studies Fund, including requirement of new States (described under Horizontal Expansion) would account for an estimated US$15.1 million total cost.

B.3.5 **Component III - Horizontal expansion** (US$26.72 million): In the four new States, four sub-components would be financed: (i) upgrading/establishment of data collection network; (ii) establishment of data processing and management systems; (iii) purpose-driven studies; and (iv) training. Under the first subcomponent, existing SW, GW and WQ data collection/monitoring networks and WQ laboratories would be set up/upgraded/replaced. Under the second sub-component, data processing, management and communication systems would be established for processing and storage of SW, GW, WQ and rainfall/climatic data. The project also plans to develop data banks in all participating State agencies responsible for SW and GW hydrology. The data that is gathered by the States and Central agencies will be shared via NICNET/internet among the States and with the respective Central agencies as per the existing protocols developed under HP-I, moving towards a vision of unrestricted transparent data exchange using established HIS. All data centers would be equipped with computer hardware and software for data processing/storage. The third sub-component, purpose-driven studies would be similar to those supported under the vertical extension component, and the same procedure would be followed in their selection/implementation. The project would also provide formal and on-the-job training using, largely, a training-of-trainers approach and the new State staff. NIH, NWA, CWPRS, IMD and specialist consultants would provide appropriate training in line with the scope, content and coverage of training courses provided during HP-I, and both professional and sub-professional staff would also be given formal training in hydrology.

4. Lessons learned and reflected in the project design

B.4. The project draws lessons principally from the recent experience of the HP-I. These key lessons are summarized below together with their implications for project design:

Institutional

a) During HP-I, the four Central-level committees have generally not been very successful in orchestrating timely, collateral decisions in departments outside HP. HP-II design would ensure increased managerial effectiveness and coordination through three HIS Management Groups focusing, respectively, on data, institutions and training, and technical aspects, in a strengthened HIS Coordination Secretariat – (HISCS) for supporting planning, procurement, reporting, networking and interaction among IAs.

b) At HP-I closure, it appears that the use of HIS data remains opportunistic and meetings of data user groups (HDUG) have mostly served as a means of informing potential users about HIS. HP-II design would, therefore, develop marketing strategies to promote data dissemination and use, packaging for specific users' requirements, use of various media, analysis of data requests and feedback from users, and HIS-related training/awareness raising for non-governmental organizations (NGOs).

c) Continuity of staff in specialized/key positions is a key requirement to ensure effective implementation of project activities.

d) Procurement: More effective participation of State agencies in case of centralized procurement of goods and services would facilitate efficient implementation of such procurement packages.

Technical

a) WQ data has become increasingly important during HP-I and this aspect will be addressed through support for appropriate institutional capacities and linkages.

b) HP design did not include data-related, value-addition studies as part of its Management Information System (MIS)/learning environment. HP-II will, therefore, develop a benefit monitoring mechanism using academic institutions and specific consultancies to develop assessments of value-addition, and training in monitoring and assessing benefits from data use would also be included.

c) Experience in the country reinforces the need to ensure, through appropriate financial and institutional mechanisms, the physical sustainability of the hydrological network and associated instrumentation.
d) Software developed within the country – particularly in the GW area (GEMS) - has often included wide-ranging functionality, resulting in elaborate and hardware-demanding capacities. HP-II would promote the use of customized, in-country software that responds to specific requirements and users' relative needs.
e) It will be useful to pilot procurement of new equipments such as digital water level recorders (DWLRs) before their large scale procurement. Existing provisions need to be reviewed to ensure that the vendor provides full service as committed in the contract documents and appropriate remedial measures in the event of liquidation of vendor/transfer of assets from the vendor to another (the DWLR procurement experience in HP-I) are built in the contract documents to protect IA's interest.

5. Alternatives considered and reasons for rejection

The possibility that the project could be included within the context of on-going or proposed State-level water restructuring/reform projects has been considered. However, given the strategic aim of moving towards broad and consistent access to and comprehensive use of the HIS data base in the country, the need to both forge firmer links between Government of India (GoI) and the States in the planning of irrigation and drainage investments, and to increase awareness and use of hydrological and meteorological data by all potential public and private sector users, the relatively-narrow, State project alternative was rejected. Instead, the integration of such hydrological development activities under a single project entity, as was the case for HP-I, would have far more impact in terms of improving both the co-ordination between the States and Central agencies and their relations with the general public in the area of water resources data use, as well as in moving towards the generalized use of a unified, countrywide common data bank similar to other countries (e.g. the US Geological Survey, British Geological Survey).

C. IMPLEMENTATION

1. Institutional and implementation arrangements

C.1.1 The project would be implemented over a period of six years from FY 2005. The institutional and implementation arrangements would be mostly similar to HP-I and major changes in organizational structure are not foreseen. Thus, overall responsibility for the project would rest with Ministry of Water Resources (MoWR), and at Central level, the existing National Level Steering Committee (NLSC) would continue as the apex body responsible for overall administrative, management and coordination. This would be chaired by the Secretary, MoWR, and members would include senior representatives of all participating Central agencies, and chair-persons of the participating States Level Steering Committees (SLSC), senior representatives of selected water user departments at the Central level and eminent experts from the water sector. NLSC would meet at least twice a year, monitor HP-II and provide strategic and policy directions.

C.1.2 The NLSC would be supported by three HIS Management Groups (HISMGs) comprising representatives of the IAs and the other water user departments/agencies, and focusing, respectively, on data use and dissemination (HISMG-DD), institutional strengthening and training (HISMG-IS), and technical (HISMG-Tech.) aspects. Each HISMG would be empowered to constitute special Task Force(s) to address specific problem areas, as they arise and would review project progress and monitoring results for reporting to the NLSC. The HIS Coordination Secretariat (HISCS) would function as the secretariat for the NLSC and HISMGs, and would be the Central nodal management structure responsible for overall project monitoring and coordination, and for collating the IAs' annual work and training programs for

agreement with the Bank at annual reviews. It would be under the administrative control of the (MoWR), headed by a Commissioner, supported by a full time team of multi-disciplinary staff drawn from the participating Central agencies of MoWR (to start with), and adequate facilities. The team would include three Director-level staff to serve as Member-Secretaries of the three HISMGs, as well as DFD. The HISCS would be assisted, on a full-time basis, by a Technical Assistance (TA) team for both technical and management aspects, including assistance on financial management and procurement. It is envisioned that, in the long term, the HISCS would transition into a HIS Cell; the positioning, role, and staffing of this Cell (including from such non-MoWR agencies as IMD and CPCB) would be proposed by the Management Consultants during the early part of the project, along with a road map for this transition.

C.1.3 In the nine existing States, arrangements already in place for HP-I would continue, while in the four new states similar structures would be developed. The current IAs would continue to be responsible for implementing the project with State-level coordination undertaken through a State Level Steering Committee (SLSC) chaired by the Secretary with representation from water user departments/agencies, and State HIS Coordination Committee (SHISCC) chaired by the Engineer-in-Chief/Director (GW) of the concerned Irrigation or Water Resources Department. In the case of State IAs reporting to more than one Secretary, the Chair of SHISCC will rotate annually. The SLSC would meet at least twice a year. Members of the SLSC and SHISCC would be drawn from the project IAs within the State, including a high-level representative of the Finance Department. Each State would nominate a State project coordinator, a training coordinator, and a procurement officer for day-to-day liaison with the Central agencies, facilitated by suitably-strengthened electronic information exchange, a fully-connected network and a computerized MIS. The agencies may also constitute, as considered necessary, an empowered committee under the Additional Chief Secretary of the State/Additional Secretary at Central agency level for approving project related procurement. The longer-term aim is to lead to a situation whereby HIS-related activities are the responsibility of a single, consolidated SW and GW data center, under a Chief Engineer/Director, thereby strengthening conjunctive water resources planning and management at the State/basin levels.

C.1.4 The main project implementing agencies at Central level are CWC, CGWB, CWPRS and NIH under MoWR; plus IMD, CPCB and BBMB. Each of these have mandates that define their respective roles in relation to project implementation, and in supporting and working with the State-level IAs. These are the following:

- CWC and CGWB would focus on their thematic areas of SW and GW, respectively; development of design aids; training through the National Water Academy (CWC) - CGWB and States' training institutions would be responsible for training in application-specific hydrology, in collaboration with respective State agencies;
- CWPRS would provide advice, training and research on hydrometric instrumentation and could also be selected to undertake specific purpose-driven studies. It would also be developed as a Center of Excellence for training in the deployment, use and maintenance aspects of instrumentation using the guidelines developed under HP-I;
- NIH would be responsible for undertaking basic training activities and in the development of DSS planning, and should be closely involved in design aids and the purpose-driven studies;
- IMD would be responsible for assisting in designing the hydro-meteorological networks and standardization of instrumentation, in supervising subsequent maintenance, serve as nodal agency for providing relevant training, drought monitoring and development of radar hydrology as part of DSS planning, and collaborate in the development of related DSS;
- CPCB would be responsible for ensuring WQ-related assurance and control systems, including certification of laboratories under HP-I and II, the adoption of new methods as they become available,

and providing an information exchange forum among laboratory operators, development of a data bank, development of design aids for SW quality, quality assurance, purpose-driven studies, DSS development activities, and training and awareness raising activities; and

- BBMB would continue to be responsible for the operation and management (O&M) of the water resource infrastructure in its mandated area, with the project providing both improved hydrological networks and strengthened operational decision support systems.

Annex 6 details the institutional and implementation arrangements and the work program of each agency.

2. Monitoring and evaluation of outcomes/results

C.2. Project monitoring would cover: (i) physical and financial progress of works under vertical extension and horizontal expansion components, and institutional development activities in IAs; (ii) DSS and supporting infrastructure; and (iii) operational performance of the HIS established under HP-I, including the progress of and feedback from the participation of Hydrology Data User Groups (HDUG) and staff training. For each of these components, a separate Monitoring and Learning (M&L) system will be developed under the respective project consultancies. These will be fully integrated in an overall MIS framework and a M&L process (based on the MIS tools already used under HP-I), covering inputs, process, outputs and outcomes, will be developed by the Management Consultants, for use by the IAs. Details of the proposed monitoring and feed-back systems as well as the proposed project evaluations are given at Annex 4.

3. Sustainability

C.3.1 The project has broad stakeholder ownership among the State government and Central-level institutions concerned. Central government's commitment to HP-II is underlined by the increasing importance that is given to water resources planning and management – particularly at basin level – and the recognition that the HIS established under HP underpins decision processes related to the distribution, in time and space, of the Country's water resources. The State governments' commitment to HP-II is demonstrated by the assurances given regarding the availability of budget lines and financial approvals for the continuation of IA activities during the current five-year plan, and the approval of State Water policies which specifically refer to the importance of developing and maintaining a robust and transparent hydrological data base.

C.3.2 **Institutional sustainability:** measures include improved overall coordination mechanisms through a strengthened HIS Coordination Secretariat and the creation of three thematic management groups. This arrangement is foreseen as evolving towards a HIS Cell and would be supported by the proposed change from a project coordinating unit to the HISCS. For the new IAs, the provision of training as under HP-I and continuing HIS-related training at all levels in the existing IAs as well as their exposure to management-change culture and practices will ensure the sustainability of management/institutional capacities within the IAs.

C.3.3 **Financial sustainability:** a number of the measures indicated above would also contribute indirectly, in as much as increasing and consolidating the IAs' abilities to develop a broad, multi-client group of users would, itself, serve to secure their financial sustainability within a government system where departments compete for financial resources. At individual IA level, HP-II would also assist in the continued development and application (as initiated under HP-I) of pricing policies which, in the long-term, would reflect value-added of basic and processed data for users, thus contributing revenue.

C.3.4 **Technical sustainability:** measures include updating hardware and software capacities in line with industry norms and the provision of related training; mainstreaming HIS use within concerned

planning and design agencies, particularly in relation to design aids and decision tools; expanding the HIS client base and generating feedback to IAs through proactive HDUGs; and support for the dissemination and sharing of technical knowledge among HIS users and IAs.

4. Critical risks and possible controversial aspects

The project requires a strong commitment from the participating governments concerned to: (i) adequately and timely fund for the program; (ii) ensure the deployment of both specialists and multi-disciplinary staff and their continuation for a minimum duration; and (iii) willingness to share data with public and private potential users. A key lesson from HP-I is that the participating agencies have to become much more pro-active both in creating value-added products that enhance the HIS, and in collaborating directly with and supporting potential users and user groups. Such pro-active outreach measures will result in the HIS being brought fully into the public domain with positive multiplier effects beyond the immediate beneficiaries. DSS technologies are new for some agencies and their uptake may proceed slower than anticipated. This risk is contained by the proposed process approach, which enables flexible planning and procurement with adjustable piloting, full technical support and adjustable annual work programs determined on the basis of results. Other technical risks would be minimized by drawing upon international practice and experience in designing DSS, using state-of-the-art methods and equipment for extending HIS to the new States, and ensuring that the lessons learned in each project activity area are shared among all IAs. The project only triggers environment assessment safeguard policy as it is a service operation and involves only minor physical works. It, however, poses only minimal environmental risks and provides considerable indirect benefits in view of its role in generating a reliable and accessible scientific data base for water resources planning and management tools. Therefore, in terms of environmental impact, the project is proposed to be rated as a Type C project.

5. Loan conditions and covenants

- To assist in the implementation of national level and State level parts of the Project, the Borrower and each of the project States shall maintain Project coordination arrangements agreed with the Bank.
- The Borrower shall engage, (a) not later than March 31, 2005, a Management Support Consultant and an Implementation Support Consultant to assist in the implementation of the Project; (b) not later than March 31, 2005, Decision Support System (DSS) Planning Consultants; and (c) not later than June 30, 2005, DSS Real Time Operational Management Consultants, and Design Aid Consultants; all shall such consultants to assist in the carrying out the activities under the project.
- The Borrower shall undertake in collaboration with the Project States and the Bank, not later than October 31 of each year, starting October 2005 an annual review of the Project, and not later than June 30, 2006 and June 30, 2008 two mid term reviews of the Project, and shall incorporate the findings of such review in the work programs.
- The Borrower and the project States shall furnish to the Bank for the Bank's review and comments not later than December 31 of each year, starting December 31, 2004, work program, cost estimates, and budget proposals for the Project for the following fiscal year.
- The Borrower and project States shall make budgetary provisions sufficient to implement the work program referred starting fiscal year 2004-2005, and for each subsequent fiscal year thereafter until Project completion.
- To assist in the management and dissemination of hydrological data generated through the Project, the Borrower and project States shall notify, not later than June 30, 2005, hydrology data user groups with membership and TOR agreed with the Bank.
- The Borrower shall take all necessary actions for providing, in a timely manner, all the funds needed for covering operation and maintenance costs for activities under the Project.

- The Borrower shall establish, in collaboration with the Project States and the Bank, and not later than December 31, 2007 computerized financial management in one of the two selected. Project States, such Project States to be identified by June 30, 2005, and not later than December 31, 2008 on the other selected Project State.

D. APPRAISAL SUMMARY

1. Economic and financial analyses

D.1.1 Three types of benefits would be generated by HP-II activities:

a) At Central level: improved resource assessment, standardized planning and design procedures; project review and approval; implementation of the national and state water policies; inter-State coordination on related sector issues; optimal water resource management; and improved awareness;
b) In new and existing States: improved design of water-related infrastructures; improved groundwater management; reduced impact of poor water quality on public health; improved state water policies and regulations; and improved awareness; and
c) In existing States and BBMB only: improved water resource planning; reduced vulnerability to and enhanced management of drought and floods; and improved management of reservoirs.

D.1.2 It is expected that establishing HIS data base (horizontal expansion) and strengthening HIS data use (vertical extension) will, among other impacts, directly contribute to reducing investment and maintenance costs in the water sector (through improved designs and operation of water-related infrastructure). HP-II total base costs at State level, for the six years of the project, account for an estimated 4 percent and 27 percent of the annual Irrigation Departments' planned budgets, in the existing and new States, respectively (0.7 percent and 4.5 percent per year). Thus, only a nominal reduction in investment costs of irrigation and flood control works alone would be sufficient to both justify economically the project's investments and ensure its positive impact on Central agencies' and participating States' budgets.

D.1.3 Specific quantification of project benefits is not feasible at this stage as it is not possible to estimate the value of India's existing hydrological data, or to quantify the marginal benefit of an improvement to the hydrological data base and data use resulting from project investment. No specific investigations have been conducted under HP-I to quantify HIS benefits and, even world-wide, such analysis remains very rare. However, during the preparation of the ICR for HP-I, the implementing agencies clearly recognized the need for demonstrating and publicizing HIS benefits. HP-II would therefore implement a monitoring and assessment mechanism for both monitoring data use and identifying benefits, based on four complementary steps: (i) Systematic registration[11] and analysis of data requests, (ii) Regular documentation of data use, (iii) Case studies analyzing HIS benefits, (iv) Consolidation of case studies at national level. Details are provided in Annex 9.

D.1.4 **Fiscal Impact**: HP-II is likely to have both a positive impact and a negative impact on the States/Central budgets. Post-project recurrent costs related to HP I and HP II activities are, respectively, estimated at some US$5.0 million and US$6.0 million in current price terms, two-third of which corresponds to incremental staff costs and one-third to incremental operation and maintenance costs[12]. However, these additional requirements are expected to be only a very small fraction of the implementing

[11] Systematic registration of data requests was already implemented by most of the agencies under HP I but little analysis has been conducted on this basis.

[12] As well as replacement of specialized equipment.

agencies' non-planned budgets. Moreover, this additional expenditure will be more than offset by the positive fiscal impacts of HP II on the Central/State budgets due to reduction of expenses related to sub-optimal water structure design, flood and drought relief, public health (improved water quality), etc. A data pricing policy was developed and adopted by most of the IAs under HP-I[13]. This policy will continue to be applied and further improved under HP II. It is important to develop a policy framework for pricing processed data, as HIS implementing agencies will be providing customized products to answer specific users' needs. However, the pricing policy shouldn't limit data use and data sharing, as these are HP-II's main objectives. A close monitoring of data use and periodic interactions with data users will help adapting the pricing policy.

2. Technical

D.2. The project would support further extension and expansion of the use of HIS for water resources planning and design using state-of-the-art DSS, design aids, and mainstreaming best practices into the relevant organizations. The establishment of such a uniform and widely-accessible HIS within India at both Central and State levels represents a major breakthrough in the country where, constitutionally, water is a State subject and where water issues are daily increasing in importance. Project activities include: (i) institutional strengthening at all levels; (ii) consolidation of HP-I achievements and introducing tools for state-of-the-art data use by participating agencies; and (iii) extending HIS to four new States and two new Central agencies. Moreover, much emphasis has now been placed in the enhancement of HIS in water quality and pollution. While the technologies proposed for typical DSS are relatively new to India, they are being initiated sporadically within India, but used in many instances outside the country. Technical risks associated with real-time DSS would be minimized by initial piloting in a few selected basins, with support from technical consultants, followed by intensive training and learning programs, which will be internalized eventually. The development of hydrological design aids would facilitate and expedite hydrologic designs within the concerned Central and State institutions. They would be developed with the help of international and national consultants, and would be based on well-established, internationally-acceptable methodologies applicable to the hydrologic design in water resources management. HIS data would be used to customize the design aids to local conditions for the agencies concerned.

3. Fiduciary

D.3.1 **Procurement**: HP-II will be implemented by the same Central agencies and nine participating States. HP-I, did not have any major procurement issues other than normal delays in implementation. Most of the staff involved in HP-I will continue to be involved in the proposed project. They have experience in handling procurement in Bank financed operations. In addition, Central Procurement Assessment Review has been carried out for the Central Government Agencies and separately for the State Governments of Karanataka, Maharashtra and Tamil Nadu, and the Bank is assisting implementation of the recommendations in Karanataka and Tamil Nadu where a procurement Law is already in place.

D.3.2 Of the new entrants Governments of Goa, Himachal Pradesh, Punjab and Pondicherry, Himachal Pradesh and Punjab have some experience in handling Bank financed projects. As many of the officials associated with the project are not familiar with Bank's Procurement procedures, it was agreed to have a procurement specialist at Central level management support consultancy to assist the States and also to nominate several staff in the implementation units to attend training programs conducted by Administrative Staff College of India (ASCI), Hyderabad and National Institute of Financial Management (NIFM), Faridabad.

[13] At a nominal rate, with exemptions for specific users such as universities.

Financial Management:

D.3.3 **Lessons Learnt from HP I:** In HP-I, the monitoring role of Project Co-ordination Secretariat (PCS) in financial management of the project was missing. There were no finance personnel in the PCS. In HP-II, this has been taken care of by the proposed involvement of the Integrated Finance Department (IFD) of the Ministry of Water Resources (MoWR) and providing a Dedicated Finance Desk (DFD) for HP-II. . An Internal financial review by the Integrated Finance Department would further strengthen the system in HP-II. In HP-I, there was also lack of uniformity in financial reporting as there was no uniform guidelines for the IAs. This is being taken care of by preparing a financial management manual to standardize the policies, procedures and reporting formats to be followed by all IAs. Another problem faced in HP-I was that of too many audit reports. In HP-II, DFD has been entrusted with the responsibility of following up with the States to ensure timely submission and also compilation of all audit observations. A TOR for audit is being finalized in consultation with project auditors (C&AG and State AGs) to comply with the requirements of the Bank's new audit policy.

D.3.4 In HP II, as part of institutional strengthening, MoWR has taken an initiative to pilot a computerized web enabled financial management software in the SW and GW departments in two States with adequate staff capacity. These pilot States would be identified before the first MTR. This software is not a project-specific software. The departments will continue to use this software even after the project closes. With these initiatives, the project would be able to adequately account for project resources and expenditures.

4. Social

D.4. The use of hydrological and climate data is common in both governmental and non-governmental sectors. Although relatively few NGOs and individual citizens will be directly involved in project implementation, increased public access (through information on web-site) to the Data Storage Centers, the creation of new - and strengthening of existing – Hydrology Data Users Group (HDUGs), and the organization of public awareness campaigns will all have a positive impact on people dependant on water resources for their livelihoods, particularly in those situations where project activities, such as flood and drought warning systems, contribute to minimizing the risks of loss of lives and properties.

5. Environment

D.5. The safeguard policy on environment assessment is triggered. The project is rated as category "C" project. There are not expected to be any significant negative environmental or social consequences of the project and the impacts of construction/installation are expected to be very localized, temporary and not significant. Overall, project interventions and outcomes will contribute to better overall sustainable environmental management through generating: (i) a reliable and accessible hydrological knowledge base of meteorology, surface and ground water resources and water quality; (ii) promotion of use of hydrological models and analytical tools such as decision support systems to mainstream environmental issues in water resources planning and management; and (iii) promotion of special-purpose studies on critical issues on environmental issues in the water sector such as pollution of SW and GW and resource conservation. The databases and analytical tools developed by the project should also help in the enhancement of dam safety in many basins. In particular, the project proposes to help coordinate the work of various agencies (e.g. water agencies, environmental agencies) on WQ data generation, management and use. In particular, CPCB will be strengthened to create a water quality data center and appropriate analytical tools to use related data, promote training and outreach, and harmonize WQ measurement, analysis and reporting protocols.

6. Safeguard policies

Safeguard Policies Triggered by the Project	Yes	No
Environmental Assessment (OP/BP/GP 4.01)	[x]	[ ]
Natural Habitats (OP/BP 4.04)	[ ]	[x]
Pest Management (OP 4.09)	[ ]	[x]
Cultural Property (OPN 11.03, being revised as OP 4.11)	[ ]	[x]
Involuntary Resettlement (OP/BP 4.12)	[ ]	[x]
Indigenous Peoples (OD 4.20, being revised as OP 4.10)	[ ]	[x]
Forests (OP/BP 4.36)	[ ]	[x]
Safety of Dams (OP/BP 4.37)	[ ]	[x]
Projects in Disputed Areas (OP/BP/GP 7.60)*	[ ]	[x]
Projects on International Waterways (OP/BP/GP 7.50)	[ ]	[x]

The environment screening category is C and the safeguard screening category is S3.

D.6. The experience with similar activities during the first project has not indicated any significant safeguard issues, and the experience with this second phase should be similar. The civil structures (water quality laboratories; data centers; gauge sites, etc.) proposed generally consist of small buildings and will be constructed on public land, as was the case in HP-I. Therefore, the safeguard policy on involuntary resettlement is not triggered. Bank's Legal Unit has clarified that OP 7.50 on International Waterways is not triggered as HP-II is basically a capacity building project to ensure that reliable data and techniques are built into water resources project planning, design and operation, and the project does not propose to finance preparation or detailed engineering design or of implementation of types of projects referred in the OP 7.50.

7. Policy Exceptions and Readiness

D.7. The preparation of the project itself evolved through a very detailed participative process with all the agencies through three workshops conducted at the project concept; preparation; and pre-appraisal stages respectively. The agencies are quite aware of the tasks they are expected to perform. Since most of the agencies have been participants in HP-I, they are well aware of the procedures and processes related to financial management and procurement aspects. The institutional structure created under HP-I is being continued by the agencies and will be a good foundation to start implementing the project as soon as the loan is approved. A draft of the Project Implementation Plan has been prepared as also a draft procurement schedule for the first 18 months of the project by the borrower. These will be finalized by negotiation. The project does not require any policy exceptions.

* *By supporting the proposed project, the Bank does not intend to prejudice the final determination of the parties' claims on the disputed areas*

Annex 1: Country and Sector or Program Background

INDIA: Hydrology Project - Phase II

1. Introduction

While a broad, post-independence consensus emerged on the means to achieve the overarching objective of India's development strategy – the eradication of poverty – it was the growth of the agricultural sector during the late-1970s and the 1980s, when the country achieved self-sufficiency in food production, that poverty reduction was positively affected.

The subsequent reforms of the early 1990's yielded positive results - with annual per capita growth rates being sustained at 3-4 percent. Recent Bank reviews[14] note that India has made a good deal of progress towards poverty reduction and to meeting the Millennium Development Goals (MDG) over the past decade. However, performance has been uneven and the country has failed to reach the levels of its other main competitors in east Asia. This will require further policy and institutional reforms aimed at, among others, improving the quality of public investments in the rural areas and at increasing agricultural productivity. These are particularly important in view of the longer-term global challenges that India faces: increasing water scarcity and continued, though slower, population growth.

With some 72 percent of the country's population living in the rural areas (2001 Census data) and agriculture accounting for some 27 percent of GDP, the rural sector is clearly central to policies aimed at sustained poverty reduction. The Bank's proposed framework for addressing rural development and poverty reduction[15] recognizes that this will require some redefining of the role of government, particularly in relation to natural resource management which ..."is fraught with externalities and provides many international, national and local public goods.....". In this respect, while the Bank will continue to support a wide range of interventions responding to India's development challenges, the CAS's main country Program Priorities will be closely aligned with the areas of emphasis in India's efforts to attain the MDGs. In the rural sector, priority assistance would include support for policy reforms in agriculture, capacity building at local levels, and enhanced community participation in project planning, implementation, maintenance, and evaluation.

2. Water Development and Hydrology

In the case of the water resources sector, there has been increasing attention given to policy debate and the government's *NWP* was first issued in September 1987. This was subsequently revised and, re-issued in April, 2002, it now emphasizes the key role that the development of water resources plays in the growth and expansion of economic activities, and outlines the technological and institutional issues that have to be addressed to ensure that future developments are both soundly conceived and sustainable, and contribute to economic growth and poverty reduction. Similar policy documents are also to be developed at State levels, supported by operational action plans.

The CAS specifically refers to the water resources sector in relation to two areas of objectives: sustainable rapid growth with equity in the rural areas and investment in physical infrastructure. Under the former, strategic objectives are to: (a) spur faster and sustainable agricultural growth and rural development by improving technical, financial, and environmental performance of irrigation systems and by improving the composition and delivery effectiveness of public spending and rural programs to close

[14] CAS Progress Report, January 2003; India Development Policy Review, June 2003.
[15] Towards Rural Development and Poverty Reduction, World Bank, June 24, 1999.

productivity gaps in irrigated and rainfed agriculture; and (b) ensure environmental sustainability by abating industrial, municipal, and agricultural sources of water pollution.

The strategic actions for sustainable growth are: (i) promoting State-level comprehensive water resource restructuring programs; (ii) supporting service institutions (WUAs and water authorities); (iii) increasing cost recovery, establishing water tariff commission; (iv) creating an enabling environment for private sector privatization; and (v) enhancing institutional capacities for community-based, participatory approaches to agricultural and rural development programs. The strategic actions required to ensure environmental sustainability are strengthened GoI pollution controls and increased investments in both rural and urban sanitation.

In line with these objectives and strategic actions, the Bank's earlier focus on system-specific projects, spanning many sub-sectors and often coupled with associated institutional and policy reforms, has evolved to sector water investment loans, generally in line with the Bank's new water policy and the recommendations of the Bank's Irrigation Sector Review (1991). Thus, with growing concerns due to extreme floods and droughts in many parts of the country and competing demands on scarce water resources among water sub-sectors impacting on the livelihoods of the poor, a paradigm shift is being made towards comprehensive planning, development and management of water resources in a river basin context.

Clearly, in this context, a reliable data base providing scientifically-verified, uniformly-acceptable and widely-accessible historical records for all aspects of the hydrological cycle is an essential pre-requisite for sound planning and development of water resources (see attached box). It is in this light that the government's national water policy places emphasis on the development of a hydrologic information system for water-related data in its entirety. The policy document indicates that ".....a standardized national information system should be established with a network of data banks and data bases, integrating and strengthening the existing Central and State level agencies and improving the quality of data and the processing capabilities. Standards for coding, classification, processing of data and methods/procedures for its collection should be adopted. Advances in information technology must be introduced to create a modern information system promoting free exchange of data among various agencies. Special efforts should be made to develop and continuously upgrade technological capability to collect process and disseminate reliable data in the desired time frame. .....apart from the data regarding water availability and actual water use, the system should also include comprehensive and reliable projections of future demands of water for diverse purposes."[16]

Not only is such a reliable data base essential for the planning and management of water resource developments but, in a country which is facing increasing competition between users and where water resources can no longer be considered solely at levels of individual hydrologic basins, there is an increasingly urgent need to deal with inter-state relations. Many of the legal decisions concerned with sharing of water resources need to rely on sound data and hydrological analyses.

[16] National Water Policy, GOI, MOWR, April 2002.

Box: Hydrological Information System: Development and Use: Some international experience

The U.S. Geological Survey (USGS) stream-gauging program provides stream flow data for a variety of purposes that range from current needs—such as flood forecasting by the National Weather Service (NWS)—to future or long-term needs—such as detection of changes in stream flow due to human activities or global warming. The development of data on the flow of the Nation's rivers mirrors the development of the country. From the establishment of the first stream-gauging station operated by the USGS in 1889, this program has grown to include 7,292 stations currently in operation. These stations do not represent a single "network" of stations, but is an aggregation of networks and individual stream flow stations that originally were established for various purposes, but all operating to a uniform data-collection standard to assure that their data are comparable. The data from about 6,500 of the USGS stations are telemetered in real time. It began in the early mid 1970's and has gradually grown from about 1,000 stations in 1983 to about 6,500 stations today. Data from the network are received at the NOAA Ground Station at Wallops Island, Virginia and then immediately retransmitted though a commercial satellite to 20 USGS Local Readout Ground Stations (LRGS) throughout the country. Real-time data are collected, analyzed, quality assured, and stored in the National Water Information System (NWIS) and made available in real time to the public, where they are used by a wide range of people and agencies for public and private purposes, such as flood forecasting, water management, recreation, navigation, and water supply. The USGS also collects real-time groundwater and water quality from selected stations, as well.

A good example of use of HIS in the integrated water resources management is the Colorado River System operated for the purpose of flood control, water quality, environmental enhancement, power production and water supply multi-purposes. The operation of this river basin is governed by a compact between the seven river basin states. The U.S. Bureau of Reclamation (USBR) operates certain key dams and storages systems in the basin while the users operate a multitude of reservoirs and diversions within each state in accordance with the water rights allocation of the compact and within the water rights systems of the individual states. This Colorado River Compact partnership relies on a comprehensive HIS operated jointly by the Federal Government by the USBR and the USGS and local HIS operated by both the States and by the users. In this instance, key monitoring and measuring stations that govern the operation of the river system with regard to inter-state allocation and use are operated by the USBR and USGS as a trust responsibility to assure the integrity of the data with regard to the inter-state compact. Within each state, the HIS system at the more local levels is operated by the State with financial and logistical support from the user community. Through a comprehensive system of communication using satellite communications, meteor burst technology and UHF, the information with regard to the flows in the river, major diversions and storage levels is made available to all of the States, users and the general public. This system also makes use of internet technology in the dissemination of this data.

Through the careful integration of the HIS with operational modeling and decision support systems for the basin, alternative scenarios of meteorologic conditions, hydrologic conditions and demand can be formulated and analyzed as a key component of the decision-making process for the management of the water resources of the basin. For example, during a recent drought in the State of Ceara, Brazil, COGERH, the State Bulk Water Management Company (river basin agency) provided such analyses to the River Basin Committee of the Jaguaribe River. Based upon the available storage in the system and various projections for the coming year, the basin agency was able to demonstrate the different scenarios of water availability and the relative risks involved in each scenario. At that point, sufficient water was available to make a full delivery for that season but such deliveries would have left the carry-over storage badly depleted. Even with an average run-off in the coming year, the basin would suffer major shortfalls. After much discussion, the Basin Committee, representing the users of the basin, voted for a reduction in allocations for that year in order to reduce the risk of shortfall for the coming year. They voluntarily requested the basin agency to reduce the percentage allocation and preserve stored water for the following year. In this way, a combination of an HIS system that enjoyed the confidence of both the users and the basin agency, combined with good decision support models and a strong institutional framework, provided a participative and cooperative decision-making process with regard to the integrated water resources management (IWRM) for the basin.

3. The Project

The development and widely-accepted use of a sound and easily-accessible hydrologic data base (HIS) would both enhance the systematic collection and use of data in planning and management across all water sub-sectors and also assist the borrower in planning and designing future investments in water sector developments on the basis of robust and scientific data. Broader access to HIS would, of itself, be a powerful stimulant for change in the way that the availability and use of scarce water resources is perceived by all stakeholders. The HP-I has enabled development of HIS in the participating agencies and now the stage is set for not only expanding the coverage of area with HIS but also use HIS to address the problems in water sector planning and management. In addressing the root problem of sub-optimal water resource planning and management and the need for integration of modern planning tools in decision making, the project is unique in the Indian context. It has unusual sectoral merit as it underpins the achievement of improving inter-sectoral water resources planning, allocation and regulation and the sustainable delivery and use of water. However, because of the range of issues that the project would have to address in developing a generalized use of HIS and in providing for inter-agency linkages, it is clear that the project should be viewed as part of a long-term engagement rather than a single intervention.

In particular, there are a number of issues facing future sector developments which would be significantly addressed by the project. These include: (i) need for efficient use of increasingly scarce water resources; and (ii) improved technological and information support systems to enable effective planning and management. The project would facilitate developing some of the important elements of both India's national water policy and the Bank's water sector strategy in moving towards optimal water resources planning and development. These elements include: (i) the development of a comprehensive data base for planning and management of water resources on a river basin approach; (ii) integrated operation of reservoir systems on a real-time basis, (iii) conjunctive use of surface and ground waters; (iv) planning for management of droughts and floods; and (v) real time operation of multi-purpose water resources projects. The project should thus be seen in the context of an overall planned program of support to India's water sector.

Finally, the Bank's involvement would not only assist the borrower in developing suitable cross-cutting institutional changes, but would also ensure that Bank-funded projects in the water sector have a strong data base underpinning robust design. The overall impact of the project would be to help India acquire tools, systems and procedures to manage inter-sector water demands more efficiently and equitably – of major benefit to the most vulnerable strata of society – as well as to plan for and manage extreme hydrologic events such as floods and droughts.

Annex 2: Major Related Projects financed by the Bank and/or other Agencies[17]
INDIA: Hydrology Project – Phase II

Project Name	Approval Date	Status	Loan size (US$M)	Project Summary	Related sector issues	IP rating	DO rating	OED rating (completed project)[1/]
Maharashtra Rural Water Supply and Sanitation Project (Cr. 3821-IN)	August 26, 2003	Active	181	Project objectives are to increase rural households' access to improved drinking water supply and sanitation services through four main components: Community development & infrastructure; Institutional strengthening; Sector development and strengthening, and piloting new initiatives.	Demand-driven service delivery; Financial sustainability; resource over-exploitation; and integrated WS&S services.	S	S	-
Karnataka Community Based Tank Management Project (Cr. 3635-IN)	April 25, 2002	Active	98.9	Project objectives are to improve rural livelihoods and reduce poverty through CBD tank irrigation. The project would strengthen CB institutions and improve tank systems, including physical interventions, training and on-farm demonstrations.	Community participation in CBRM; demand-driven development; rural decentralization; and Int. Land & Water Mngt..	S	S	-
UP Water Sector Restructuring Project (Cr. 3602-IN)	February 19, 2002	Active	149.2	The project will establish institutional and policy frameworks for sector reform, and initiate sub-sector reforms, pilot IWRM options and O&M of I&D systems, and TA for studies, implementation support and M&L.		S	S	
Rajasthan Water Sector Restructuring Project (Cr. 3603-IN)	February 19, 2002	Active	140	The project strengthens WR planning, development and management and increases irrigated agriculture productivity through institutional strengthening and improved irrigation systems.		S	S	
Karnataka Rural Water Supply and Sanitation	December 18, 2001	Active	151.6	The project improves rural access to drinking water and sanitation services through financing institution building	Demand-based development; scaling-up sector reforms; and	U	S	-

[17] There are no major related project financed by any other agencies.

Project Name	Approval Date	Status	Loan size (US$M)	Project Summary	Related sector issues	IP rating	DO rating	OED rating (completed project)[1/]
Project (02) (Cr. 35900-IN)				and infrastructure, and project management.	integrated WS&S services.			
Kerala Rural WS and Environmental Sanitation Project (Cr. 3431-IN)	November 7, 2000	Active	65.5	The project strengthens institutional capacities and CB WS systems. A tribal development program will also address water scarcity and capacity building, with TA for planning and management aspects, and support for sector reforms.		S	S	-
Andhra Pradesh Irrigation Project (03) (Cr. 29521-IN; Ln. 4166-IN))	May 20, 1997	Active	325	The project will complete irrigation works, pilot reforms for improved public irrigation performance, ensure dam safety and sustainability, implement environmental improvements, and improve M&E.		S	S	-
Environmental Management Capacity Building Project (Cr. 2930-IN)	July 30, 1996	Closed ?	50	The project's objective is to strengthen GoI's environmental management capacity for effective implementation of its EAP. The project would strengthen environmental policy planning and monitoring and compliance at center, state and local government levels; and support community-level and NGO environmental mitigation initiatives.	Appropriate environmental policies and enforcement of environmental legislation; investments to address area-wide environmental issues.	S	S	
Orissa Water Resources Consolidation Project (Cr. 2801-IN)	December 19, 1995	Active	290.9	The project will improve planning, management and development of water resources and increase agricultural productivity through improving/completing scheme infrastructure and institutional strengthening.		S	S	-
Hydrology Project (Cr. 2774-IN)	August 22, 1995	Closed	142	The project assisted GOI and nine States to develop comprehensive, easily-accessible hydrologic information systems using common standards, processes and procedures.		S	S	-

Project Name	Approval Date	Status	Loan size (US$M)	Project Summary	Related sector issues	IP rating	DO rating	OED rating (completed project)[1/]
				The project financed improved hydrological and hydro-meteorological data networks and data processing systems, TA and institutional strengthening.				
Tamil Nadu Water Resources Consolidation Project (Cr. 2745-IN)	June 20, 1995	Active	282.9	The project's objectives are to strengthen the irrigation sector and the State's related institutional capacity through system improvement and completion; water planning and environmental management; and institutional strengthening.		S	S	-
Madras Water Supply Project (02) (Cr. 39076-IN)	June 20, 1995	Active	275.8	The project aims to provide reliable water supplies, improve the distribution system and strengthen conservation. It finances: water abstraction, transmission and distribution works; a water conservation program; and technical assistance.		S	S	
Karnataka Rural Water Supply and Environmental Sanitation Project (Cr. 2483-IN)	April 20, 1993	Closed	92	The project's aim was to increase rural living standards through the construction/rehabilitation of WSS facilities; community health communication; and institutional strengthening.		S	S	-
Dam Safety Project (Cr. 2241-IN)	May 14, 1991	Closed	153	The project's objectives were to: strengthen institutions concerned with dam safety assurance at Central and State levels and to upgrade the safety features of 33 dams.		S	S	Uncertain

Annex 3: Results Framework and Monitoring

INDIA: Hydrology Project - Phase II

Results Framework

PDO	Outcome Indicators	Use of Outcome Information
Extend and promote the sustained and effective use of the existing Hydrologic Information System (HIS) by all potential users concerned with water resources planning and management, both public and private, thereby contributing to improved productivity and cost-effectiveness of water-related investments in 13 States and eight Central agencies	HIS mainstreamed by 90% of Implementing Agencies, and consistently used by them, as well as by other Hydrologic Data User Group (HDUG) members and individuals, to meet their planning and design requirements	**YR1-YR3**: (i) monitor and evaluate achievements on institutional and attitudinal changes on the use of HIS in planning and management of water resources; **YR3-YR5**: (i) develop procedures and establish protocol in hydrologic data use in investment planning to project planning and design; (ii) Determine if the strategy for mainstreaming HIS, design aids and decision support systems (DSS) in water resources departments needs to be modified. **YR4:** MTR to confirm if initial design assumptions are still valid, and provide suitable adjustments within the overall project scope . **YR5-YR6**: Consolidate the above for mainstreaming program and evaluation
Intermediate Results	**Results Indicators for Each Component**	**Use of Results Monitoring**
Component One: Institutional Strengthening Agencies have the necessary capacity to use and promote the broad use of HIS among private and public sector users, and to develop proactive response systems to meet HDUG needs.	**Component One:** IAs strengthened with requisite trained staff in place. HIS fully equipped, operational, functioning effectively, and provided with adequate O&M funds; proactive HDUGs representing water resource stakeholders are in place.	**Component One:** PY 1-5: Low levels of achievements may signify either poor ownership of the project by the agencies, or serious bottlenecks in procurement of the necessary inputs.
Component Two: Vertical Extension All concerned agencies and other users adopting the design aids and DSS for water resources planning and management activities, and the purpose-driven studies have contributed to knowledge advances in the country's water sector.	**Component Two :** a) 50% of targeted design aids developed in the IAs have been incorporated into standard practice. b) In 75% of agencies where decision support systems have been successfully piloted, are being replicated through in-house expertise.	**Component Two:** PY 1-5: Identify the issues and bottlenecks in development of various activities in each agency to enable effecting course correction. Enable mainstreaming HIS in the water resources department and increase data use by private sector.

	(c) At least 10 different types of private sector entities in each State are using HIS data and design aids.	
Component Three: Horizontal Extension HIS established in the four new States and two new Central agencies, and transparent and easy access for all users provided.	**Component Three:** (a) 80% of agencies with fully-functional HIS (operational measurement sites/water quality labs and data processing/storage centers etc.); (b) At least 10 different types of private sector entities in each State are using HIS data and design aids.	**Component Three:** Will signify success of consultancy and agencies' pro-activity in building up the necessary capacity. Will also identify bottlenecks in mainstreaming HIS and flag issues/bottlenecks related to data use by the private sector.

Arrangements for results monitoring

		Target Values						Data Collection and Reporting		
Outcome Indicators	**Baseline**	**YR I**	**YR2**	**YR3**	**YR4**	**YR5**	**YR6**	**Frequency and Reports**	**Data Collection Instruments**	**Responsibility for Data Collection**
HIS mainstreamed by 90% of Implementing agencies and consistently used by them, as well as other HDUG members and individuals, for their planning and design requirements	To be taken as IAs once enter the project (10%)		-----	60%	80%	85%----	90%	Yearly cumulative Semi-annual progress report, MTR reports	HISCS progress reporting MIS	Management Consultants, HISCS and IAs
Results Indicators for Each Component										
Component One : Institutional Strengthening. Agencies have the necessary capacity to use and promote the broad use of HIS among private and public sector users, and to develop proactive, response systems for HDUG needs.	70% in 9 HP-I agencies		**75%**	**80%**	**80%**	**80%**	**90%**	Quarterly and Yearly Cumulative reports on implementation status, issues for each of the component	Progress Reports/ MIS Special Reports	Management Implementing Consultants/ IA HISCS
Component Two: Vertical Extension All concerned agencies and other users adopting the design aids and DSS for related water resources planning and management work, and the purpose-driven studies have contributed to knowledge advances in the country's water sector.	Very little practice at present (0%)		-----	**40%**	**50%**	**70%**	**80%**	Semi-annual progress report and mid-term review reports	Base line surveys; MIS reports	Implementing Consultants, DSS consultants, HISCS and IAs
Component Three: Horizontal Extension HIS established in the four new States and two new Central agencies, and transparent and easy access for all users provided.	To be undertaken in YR1 (0%)	none	**25%**	**50%**	**65%**	**75%**	**80%**	Semi-annual progress report and mid-term review reports	Base line surveys; MIS reports	Implementing Consultants, HISCS and IAs

Annex 4: Detailed Project Description

INDIA: Hydrology Project – Phase II

A. Project Components

1. The main components of HP-II are: (i) Institutional strengthening: covering all 13 States and 8 Central agencies; (ii) Vertical extension: covering the nine existing HP-I States and 8 Central agencies including the two new Central agencies (CPCB and BBMB); and (iii) Horizontal expansion, covering the four new States.

I. Institutional Strengthening (US$49.38 million)

2. Institutional strengthening would consist of three sub-components providing for: (i) the consolidation of HP-I activities in the existing States; (ii) the strengthening of HIS awareness and data and knowledge dissemination and sharing; and (iii) support to all IAs for implementation. Technical assistance would be financed in support of these activities.

Consolidation of HP-I Activities (US$7.67 million)

3. This would support the existing IAs with continued/extended training in HIS data processing and software provided under HP-I as well as training in the use of specialized WQ equipment and upgrading IT hardware/software and hydrometric equipment. The focus would be on strengthening capacities of the agencies to use existing hardware/software/equipment on a sustained basis. Physical and financial sustainability of operation and management of the hydrological network and instrumentation established under HP-I would be supported through: (i) improving related capacity at agency levels, (ii) creation of a Center of Excellence for equipment maintenance in CWPRS, and (iii) upgrading hardware, software, hydrometric equipment, network capacity, and procurement of spatial data sets. The project would also finance improved data processing, spatial analysis and dissemination of standard and user-specified maps, together with related capacity building.

Awareness, Dissemination and Knowledge Sharing (US$10.43 million)

4. The project would finance management consultancy services to assist the HISCS with the formulation of a strategy and detailed operational proposals for spreading awareness, dissemination and knowledge sharing among IAs and HIS users, and to train IA personnel in these areas. This would be undertaken through interactive workshops and the use of researched and validated interventions. The project would also finance the development and maintenance of websites for IAs, the creation of resource material for different media, and publications.

Implementation Support (US$31.28 million)

5. The management consultancy would also be used to assist the HISCS as well as State-level IAs with implementing the project. Services would include assistance with: monitoring and learning; financial management; procurement; planning tools and MIS; management information network; organizational development and process improvements leading towards a culture of collaboration, commitment and creativity, including greater collaboration between SW, GW, and WQ agencies.

B. Vertical extension (US$58.95 million)

6. Vertical extension in the nine HP-I States and eight Central agencies would include activities which utilize and enhance the use of HIS data. Sub-components would include: (i) development of hydrological design aids, (ii) decision support systems (DSS); and (iii) purpose-driven studies. The project would also support the above sub-components through the provision of spatial data inputs and outputs and data visualization. The scope and size of upgrading would depend on the nature (planning and real-time DSS) and scope (objective, area coverage, spatial resolution, etc.) of the activity, and would be matched with the role/capacity of participating operational agencies. Selective upgrading may include procurement of NOAA satellite ground station, data link to IMD/NRSA for real-time meteorological satellite (INSAT/ NOAA) data, current and historic earth resources satellite data, commercial SRS/GIS software (and necessary hardware), SRS/GIS services including customized application software, technical assistance and training.

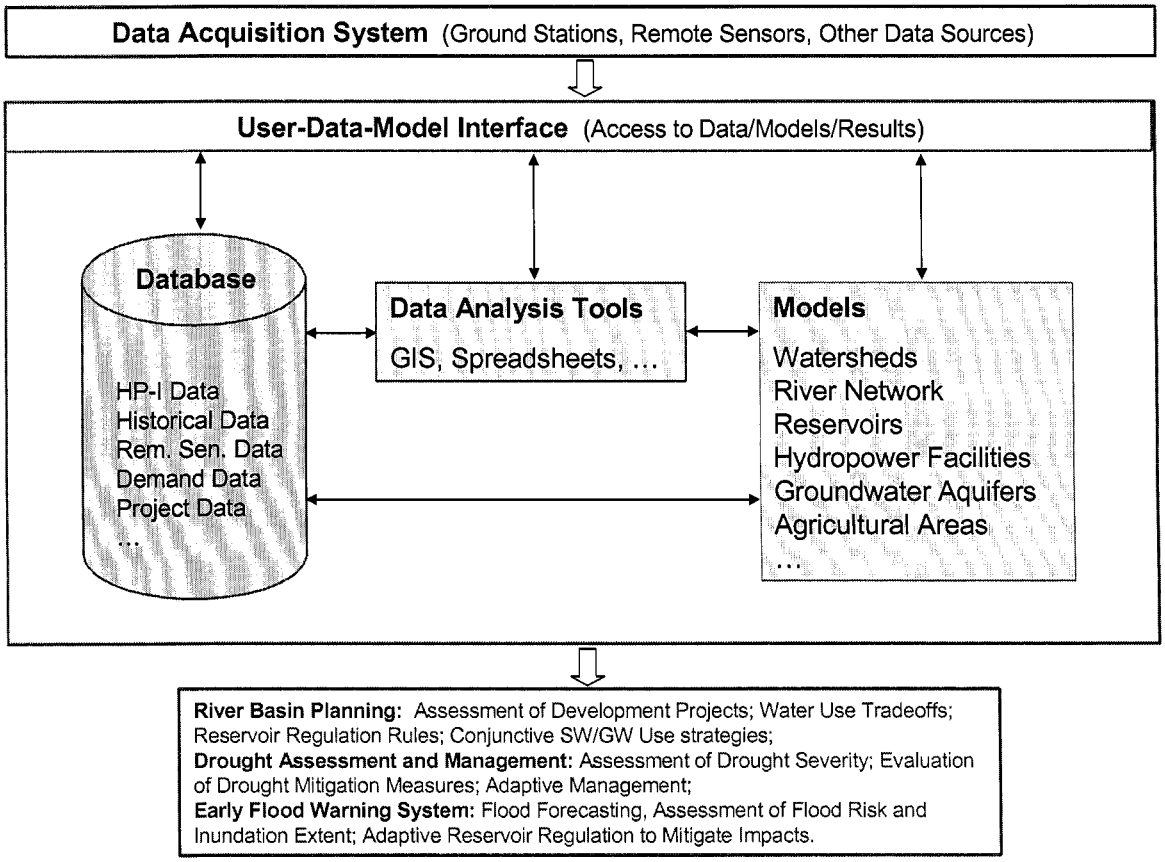
Development of Hydrological Design Aids (US$4.39 million)

7. The project would promote the use of HIS through the creation/development of standardized hydrological design aids (SW, GW and WQ) in all 13 participating States using well-established, internationally-acceptable methodologies. These design aids would facilitate and expedite hydrologic design (e.g. the hydrological assessment of un-gauged and partially-gauged catchments) and would also, for the first time, provide the basis for uniform approaches among States and also between States and Central agencies. The subcomponent would be implemented by CWC, CGWB and CPCB, in conjunction with NIH and participating IAs, and would be supported by international and national consultancies. The design aids would be developed and standardized in years 2, 3 and 4 of project implementation and customized by each State in years 5 and 6 using their respective HIS.

Decision Support System (DSS) (US$41.69 million)

8. The development of decision support systems, consisting of information systems linked to appropriate models, would also be supported under the project to promote the use of the data generated under HIS. Two types of DSS would be included: (i) a water resources planning and basic operational DSS for selected States and Central agencies; and (ii) a real-time advanced operational DSS for the Sutlej and Beas basins for BBMB. The DSS activities would be supported through the provision of appropriate consultants, equipment, associated civil works, software and data development, training and incremental operating costs. The concept and typical elements and structure of a DSS are indicated schematically below:

Decision Support System Concept – Hydrology Project II



9. Planning DSS would be related to SW and GW planning, reservoir operation, irrigation management, drought management, conjunctive use of SW and GW, and water quality. They are intended to support decisions required at relatively extended time intervals, such as one week, 10 days, one month, or longer planning horizons. Such DSS are proposed for use in all nine HP-I States with a possible scope and geographic focus as indicated in the table below.

Summary of Proposed DSS under HP-II

Planning DSS

State	Scope of DSS	Location
Andhra Pradesh	Surface Water Forecasting, Optimization & Simulation	Lower Krishna Basin
Chattisgarh	Conjunctive Use	Shivnath Sub-Basin
Gujarat	Surface Water Planning	Tapi/Mahi Basin
Karnataka	Drought Mgmt. (Palar); Conjunctive Use (Tungabhadra); Water Planning (Malaprabha)	Palar, Tungabhadra, Malaprabha
Kerala	IWRM; Basic Reservoir Operations	Pilot Basins
Madhya Pradesh	Drought Management; Water Planning	Drought Mgmt (Tapti, Mahi & Godavari Basins); Water Planning (Wainganga)
Maharashtra	Planning (SW & GW); Drought Mgmt.	Bhima Basin
NWA	DSS Research & Training	Supporting selected State DSS work
Orissa	Drought Management; Conjunctive Use	Mahanadi Basin
Tamil Nadu	Drought Management (Vaippar); Conjunctive Use (Cauvery); Basic Flood Mgmt. (Thambiraparani)	Vaippar, Cauvery, Thambiraparani Basins

DSS for Real-Time Flood Forecasting and Management

Agency	Basin/State	Scope of DSS
Bhakra-Beas Management Board	Sutlej-Beas Basin	Real-Time Operational Management
IMD	Himachal Pradesh	Radar Hydrology

10. Real-time DSS for flood management and advanced operations are used to support operational decisions required at daily or shorter time intervals. Such decisions relate to the scheduling of reservoir releases and hydropower turbines, the operation of spillway gates, the issuance of flood warnings, and the deployment of area evacuation measures. Real-time DSS require sophisticated data acquisition systems and modeling technologies as well as technical support staff with advanced and specialized training. Thus, compared to the planning DSS type, they are considerably more costly, both initially as well as on a continuing basis. Under the project, real-time DSS is proposed for one pilot basin: the Sutlej-Beas basins (under the jurisdiction of the BBMB) for real-time operations. The BBMB system has been selected given its history as a basin management board and its institutional capacity. While many other basins would also benefit from management systems, the purpose of piloting the development of real-time DSS is to acquire the necessary experience for implementing targeted, sustainable, and cost-effective DSS more widely both among project IAs and throughout India. This would also be achieved by associating and training all relevant IAs from other States in the development and implementation of the real-time DSS under the project as well as those developed for real time flood forecasting for Mahanadi basin.

11. In addition, special-purpose DSSs would be developed to support such agencies as CPCB for special modeling studies such as contaminant transport, water quality classification and waste-load allocation. These would be generic in nature and would be relevant to issues at national level, cutting across all the agencies.

Purpose-driven Studies (US$12.88 million)

12. A large number of studies (over 50), costing about Rs. 1200 million, in SW, GW, and WQ have been proposed by the State and Central agencies as purpose-driven studies (about Rs. 1300 million, if including the New States). These are mostly for routine topics on SW or GW assessments, artificial recharge and WQ without clear indications of the needs for or suitability of the proposals. Therefore, the following selection criteria have been recommended to enable the agencies to refine their proposals before these are screened by an appropriate committee/group at the national level. According to the selection criteria, the studies should: (i) be related to an identified issue concerning water management in the agency's area of competence and operation; (ii) be related to specific (not generic) issues of water management of public concern for which solutions have not been identified so far or, if they have, then they did not work satisfactorily; and (iii) provide for feasible and cost-effective replication of the proposed methodology in the study under the agency's jurisdiction. The project would, therefore, support the implementation of appropriate purpose-driven studies based on the above criteria, and on the basis of prior review and approval by the HIS Management Group (Technical). The concerned activities would be financed from a Studies Fund and implementation progress would be assessed during the first MTR, with recommendations for further studies made on the basis of experience and achievements. It is expected that the State/Central agencies would review/revamp the studies included in their proposals for the screening/selection process in PY 1, for possible implementation in PY 2-6. Some of the studies proposed (e.g. reservoir sedimentation) could be done jointly by a group of States in collaboration with CWPRS. The results of all purpose-driven studies would be shared nationally.

The table presented below gives details of the comparative characteristics and details of these sub-components.

Distinguishing Characteristics of proposed Vertical Extension Sub-Components

	Design Aids	DSS - Planning	DSS – Real Time	Purpose-Driven Studies
Aim	Developing generic tools for project-level design, operation, and management using hydrologic data.	Developing planning tools (information systems + simulation/optimization models) for longer time periods, viz., weekly/monthly periods for water planning (e.g. integrated WRM in basin context, drought management, basic reservoir operations, GW pollution management, waste load allocation, national WQ assessment and use etc.).	Developing forecasting and operational tools (real-time information systems, communication systems, and models) for short interval (hours/days) to assist with real-time system operation.	Assisting agencies in studying/ piloting options to address specific issues in a localized geographical area.
Characteristics	• Makes best use of available hydrologic and other information • Of importance to the generic issues relevant to water resources project planning and design; • Generally, the issues should be relevant to multiple agencies and similar hydro-climatic regions of the country; • Should have a strong user demand; • Should include sufficient discussion/ dissemination associated activities.	• Makes best use of available hydrologic and other information. • Limited network extension possible in selected basins. • Uses most appropriate modern tools and techniques. • Should have adequate training of agency staff on the DSSs developed	• Same as Planning DSS: includes real-time and communications equipment and associated civil works incremental to HP-I network (determined by Consultant in consultation with IAs, CWC and PCS); • Obvious benefits of real-time DSS (e.g. current flood damages or need for real-time operation); • Large basins with sufficient lead times for practical applications; • Basins should pilot working in different institutional arrangements (e.g. Basin Board or across Central and multiple State agencies) • Training to all IAs on the pilot work	• Should not be routine study/work but address important issues in relation to water management and use for a particular agency in the water sector (e.g. pollution hotspots, drought, water logging, etc.); • Preference for demo. potential and use in other areas; • Could include supporting investments (e.g. specialized equip.); • Should include sufficient associated discussion/ review/dissemination
Level of Development	Agency level	Agency/basin level/National	Basin level	Agency level
Level of Consultancy	National level (CWC, CGWB, CPCB with close collaboration with NIH)	National level	Agency level	Agency level
Screening for selection	Key required design aids selected by Appraisal; fine tuned in formal ToR.	Basins and applications selected by Appraisal ; fine tuned in formal ToR. And during consultancy.	Basins and applications selected by Appraisal ; fine tuned in formal ToR. And during consultancy.	To be identified by the agencies on initial criteria developed and thereafter screening through HIS Management Group (Technical)

III. Horizontal extension (US$26.72 million)

13. In the four new States (Himachal Pradesh, Goa, Pondicherry and Punjab) , four sub-components would be financed: (i) upgrading of data collection network, (ii) upgrading of data processing and management systems, and iii) purpose-driven studies; and (iv) training.

Upgrading of Data Collection Network (US$12.95 million)

14. The project would assist the agencies in the four new States to upgrade their data collection networks, including for new and renovated river gauging stations and appropriate equipment, upgraded and new GW and aquifer monitoring systems (including piezometers, automatic and digital water level recorders, exploratory/observation boreholes), new and upgraded meteorological stations and new water quality laboratories. Initial joint surveys with the concerned Central agencies[18] would determine the appropriate sites for additional stations and the proposed equipment types. Details of the project works are given in the table below, and detailed cost estimates are presented in Annex 5.

Technical area	Item	H. Pradesh	Goa	Pondicherry	Punjab
Surface Water	RG sites – upgrading	15	12	10	58
	RG sites – new	40	10	10	33
	AWLR	40	22	10	33
	Current meter	16	22	22	65
Groundwater	Observation wells	70	145 (rehab)	20	750
	DWLR/AWLR	35	45	10	100
	GW monitoring kit	12	8	3	15
Hydro-meteorology	SRG	57	0	0	100
	ARG	22	0	0	10
	FCS	6	8	3	-
	Snow Gauges	16	-		-
Water Quality	Level I labs. – new	12	-	-	
	Level II labs. – new	2	-	-	2 (WRED)
	Level II+/III lab. – new	1	1	1 (SW & GW)	1
	Level II lab.- upgrade				

15. Improved groundwater networks would be used to monitor piezometric relationships, the characteristics of both shallow and deeper aquifers and/or WQ relationships. The project will also provide field instruments such as water level sounders (biaxial electric tapes), portable EC and pH meters and thermometers to all observers involved in observing/maintaining GW monitoring networks. Portable

[18] CWC for SW stations; CGWB for GW monitoring sites; IMD for rainfall/climate stations; and CPCB for WQ laboratories.

compressors/generators with submersible pumps are also provided for obtaining unstagnated samples for WQ analysis from observation tubewells.

Upgrading Data Processing and Management Systems (US$11.01 million)

16. The project would assist all agencies responsible for SW and GW in the four new States to develop HIS systems similar to those implemented during HP-I. Thus, each agency would be provided with a data- bank system and the agency will be responsible for verifying and validating data, maintaining the integrity of the data, and for data storage. Intra- and inter-agency communication linkages would be provided, as appropriate, by telephone, NICNET or internet enabling free and transparent exchange of data between agencies.

17. Similar computing and software packages will be provided to state data centers. The computer hardware will consist of a network based on a file server for data storage and retrieval connected to at least eight PCs with provision for connection to further PCs. The system will run specialized software for SW, GW and WQ data processing/management. Ancillary equipment would include monitors, digitizers, scanners and plotters to assist in the production of maps. Standardized computing/software packages will be installed at regional/divisional and sub-divisional levels. The number of PCs and the software supplied to laboratories will depend on their grading (e.g. Level I, Level II, etc.). The entry and verification of data in the HIS will follow the same procedures as developed for HP-I.

Purpose-driven Studies (US$2.21 million)

18. Purpose-driven studies undertaken by the four new States would be subject to the same review and selection procedure proposed for the studies in the nine HP-I States under the vertical extension component – see para 12 above).

Training (US$0.56 million)

19. The project would provide formal and on-the-job training to all project staff using, largely, a training-of-trainers approach and state staff. NIH, NWA, CWPRS, IMD and specialist consultants would also provide appropriate training similar to the training courses provided during HP-I. Both professional and sub-professional staff would also be given formal training in hydrology.

Project Monitoring and Evaluation

20. The Management Consultants would also develop a self-monitoring mechanism for the IAs as well as for the HDUGs, including appropriate staff training and support for implementation. Similarly, these consultants would also develop and assist in the implementation of user-feedback mechanisms, including those related to user satisfaction surveys. The process approach proposed for the project requires regular appraisal of implementation progress so that mid-course corrections can be made. Such adjustments will be required as the IAs' implementation experience will probably evolve non-uniformly (as has been the case under HP-I) and their abilities to adapt to changes in the way that water sector project planning and management is undertaken, given new technology and processes, will also vary. Therefore, project evaluation, including benefit monitoring, would be carried out by the Management Consultants supported by other specialized consultants as necessary, at: (i) project start-up for the base-line situation; (b) at an interval of two years (designated as mid-term reviews) – see table below; and (iii) the end of project implementation.

Review	Timing	Nature	Purpose
Mid-Term Review 1	At the end of PY 2	Evaluation	To assess changes in organizational development and processes in the agencies as envisaged
Mid-Term Review 2	At the end of PY 4	Evaluation	To assess the improved technical capacity and tools available and the use being made of these tools in addressing issues in water sector planning

Annex 5: Project Costs

INDIA: Hydrology Project- Phase II

Project Costs and Financing Plan

1. **Basis of Costs Estimates:** The tentative project cost estimates have been developed on the basis of the IAs' proposals and review by the pre-appraisal mission. The costs are based on January 2004 prices and include taxes and duties. Unit cost estimates for works and equipment have been derived from similar activities and procurements recently completed by CWC, CGWB, CPCB and the State agencies, particularly in the context of the implementation of HP-I, and have been updated to reflect price evolutions. The costs of consultants are based on recent contracts for foreign and local consultancy services in India. Physical contingencies to allow for possible quantity and design variations were applied at 10% for civil works and equipment, 5% for training and incremental recurrent costs, 2.5% for international consultancy and 0% for national consultancy. Price contingencies, for expected price variations, were applied to the foreign exchange component at 0% until project start, 1.6% in FY 2005 and 1.2% thereafter. For local costs, price contingencies were applied at 5% in 2004 and thereafter. The cost estimates take into account the expected changes in the currency equivalent over the project period. With regard to the project financing, the estimate of GoI's contribution is based on the agreed *Standard disbursement percentages for consulting services and salaries of staff of project implementation units*, updated in March 2003, as well as percentages applied under HP I. With respect to "incremental recurrent costs", the reimbursement percentages proposed are as below:

Project Year	% reimbursement
Until March 31, 2007	80
Until March 31, 2008	75
Until March 31, 2009	60
Till Project closure	50

2. On these bases, the total project costs (including financial and physical contingencies) are estimated at US$135.05 million (Rs 6318 million) of which US$116.8 million (Rs 5256 million) of base costs and US$18.25 million (Rs 1062 million) of contingencies. Contingencies will account for some 16% of the project base cost (respectively 9% and 7% for price and physical contingencies).[19] The three project components, institutional strengthening, vertical extension and horizontal extension, would each total an estimated US$49.38 million (36%), US$58.95 million (44%) and US$26.72 million (20%), respectively. Of the total, some US$47.40 million (35%) would be allocated to the existing States, US$55.73 million (41%) to the Central agencies and US$31.93 million (24%) to the four new States. The project total costs, by major component and sub-component, are shown in Table 1 below:

[19] Costab program generated an overall estimate of the physical and price contingencies.

Table 1: Project total costs, by major component and sub-component

Project Cost by Component Activity	Local (US$ million)	Foreign (US$ million)	Total (US$ million)	% of Base Cost
A. Component I: Institutional Strengthening				
1. I.A. HP I Consolidation	4.83	1.80	6.63	6
2. I.B. Awareness, Dissemination and Knowledge Sharing	7.05	2.05	9.10	8
3. I.C. Implementation Support	23.52	3.83	27.36	23
B. Component II: Vertical Extension				
1. II.A. Hydrological Design Aids	1.64	2.22	3.86	3
2. II.B. Decision Support Systems	23.04	13.07	36.10	31
3. II.C. Purpose-Driven Studies (Vertical Ext.)	8.41	2.62	11.03	9
C. Component III: Horizontal Expansion				
1. III.A. Upgrading of Data Collection	9.51	1.56	11.07	9
2. III.B. Upgrading of Data Processing and Management	7.59	1.73	9.31	8
3. III.C. Purpose-Driven Studies (Horizontal Exp.)	1.46	0.39	1.85	2
4. III.D. Training for Horizontal Expansion	0.46	0.02	0.49	0
Total BASE COSTS	**87.51**	**29.29**	**116.80**	**100**
Physical Contingencies	5.96	1.75	7.71	7
Price Contingencies	8.56	1.98	10.54	9
Total PROJECT COSTS	**102.03**	**33.02**	**135.05**	**116**

3. The breakdown of the project component costs by categories of expenditure is shown in Table 2 below:

Table 2: Project Total Cost by Category of Expenditure (US$ million)

-	Civil works	Goods & equip.	Consultancy	Training	Incremental Recurrent Costs	Total
Institutional Strength.	5.85	10.37	9.46	7.34	16.36	49.38
Vertical Extension	6.48	23.09	16.40	3.18	9.80	58.95
Horizontal Expansion	7.55	7.86	0.31	0.77	10.23	26.72
Total Project Cost	**19.88**	**41.32**	**26.17**	**11.29**	**36.39**	135.05
Percentage of Project Cost	15	31	19	8	27	100

4. The direct and indirect foreign exchange costs are estimated at some US$33.02 million, or about 24.4% of total costs. Foreign costs would mostly consist of international consultancy services, the procurement of specialized equipment (digital water level recorders, equipment for real- time hydrological and meteorological data monitoring as well as real-time data transmission), commercial software, oversea trainings and study tours, and vehicles.

5. The proposed IBRD loan of US$105.51 million will finance about 78 percent of the project total cost including taxes and 100% of the direct and indirect foreign costs and 71 percent of the local costs including taxes (or 81 percent of local costs excluding taxes). GOI will finance the remaining project costs, which will mostly consist in costs corresponding to taxes and recurrent costs.

6. The breakdown of project total costs including contingencies by Implementing Agency is also detailed in Table 3, below:

Table 3: Project Cost by Implementing Agency

	Base Cost (Rs. million)	Share of Base Project Cost (%)
Andhra Pradesh SW	70.0	1.33
Andhra Pradesh GW	108.0	2.05
Chattisgarh SW	84.4	1.61
Chattisgarh GW	92.2	1.75
Gujarat SW	94.4	1.80
Gujarat GW	104.4	1.99
Karnataka SW	90.9	1.73
Karnataka GW	144.4	2.75
Kerala SW	75.6	1.44
Kerala GW	108.0	2.05
MP SW	82.1	1.56
MP GW	120.4	2.29
Maharastra SW	98.1	1.87
Maharastra GW	130.3	2.48
Orissa SW	101.2	1.93
Orissa GW	112.3	2.14
TN SW	87.1	1.66
TN GW	119.4	2.27
Total Existing States	*1823.2*	*34.69*
BBMB	242.3	4.61
CWC	249.0	4.74
CGWB	279.6	5.32
CWPRS	37.0	0.70
CPCB	167.0	3.18
IMD	316.4	6.02
NIH	484.5	9.22
MOWR	433.4	8.25
Total Central Agencies	*2209.2*	*42.03*
Goa	187.1	3.56
Himachal Pradesh	495.0	9.42
Punjab	409.5	7.79
Pondicherry	131.6	2.50
Total New States	*1223.5*	*23.28*
Total Project Cost	**5255.9**	**100.00**

Cost Abstracts (Rs. million)

Base Line Cost:	5255.9
Physical Contingencies	349.9
Price Contingencies	715.5
Total Project Cost	6318.3

Aggregating both HP-I and HP-II costs (see Table 4 below) shows that Central and State governments will contribute an estimated 24% of the HIS set-up costs, though demonstrating a clear commitment towards HIS development.

Table 4: HP I and HP II cost breakdown by financier; post-project recurrent costs (In US$ million)

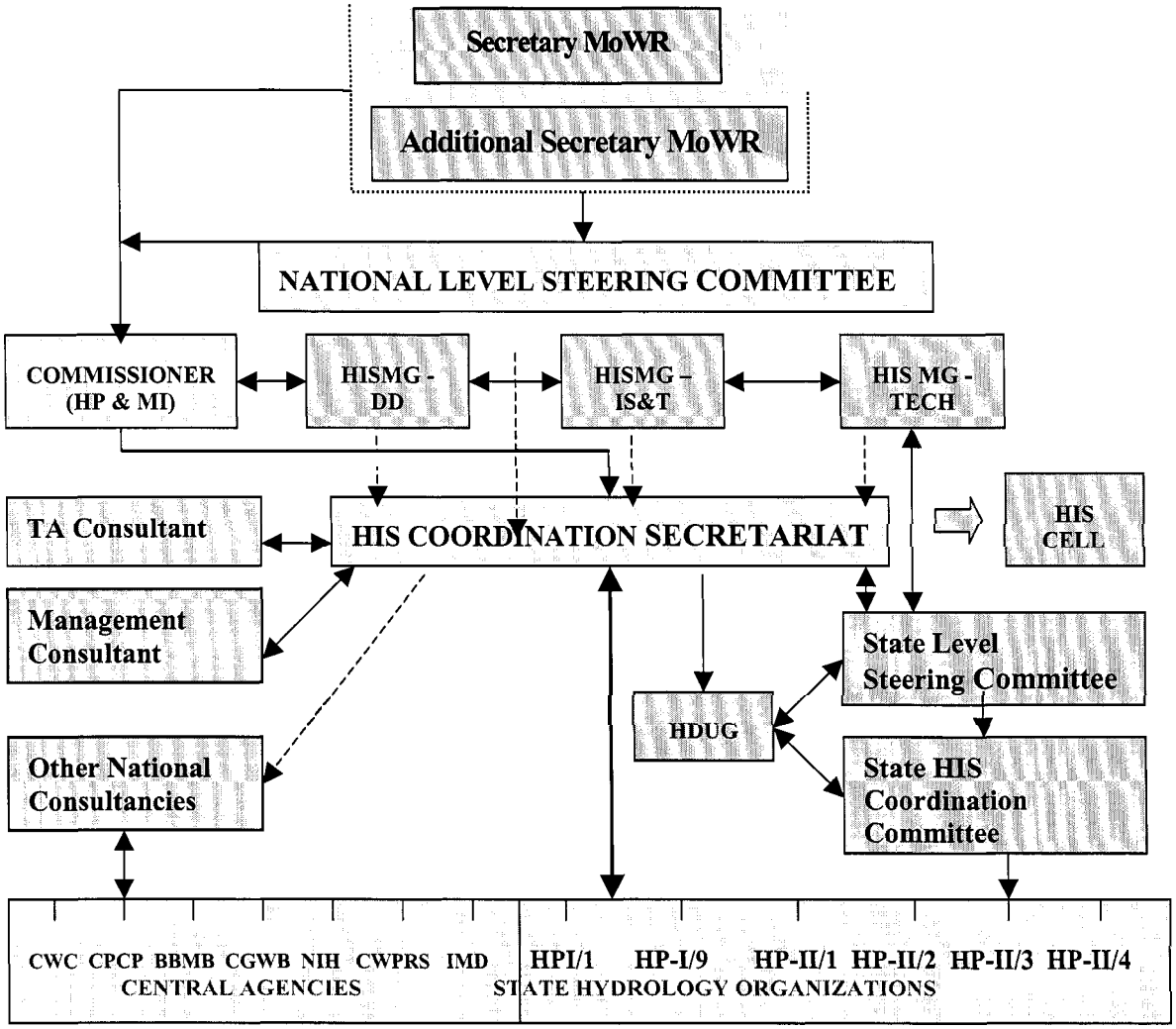
	HP-I		HP-II		HP-I + HP-II	
	Amount	**% of Total**	**Amount**	**% of Total**	**Amount**	**% of Total**
World Bank Loan	98.0	65%	105.5	78%	203.5	71%
Central and States Governments' Contribution	37.9	25%	29.5	22%	67.4	24%
Government of Netherlands Grant	15.7	10%	--	--	15.7	5%
Total Cost	**151.6**	**100%**	**135.0**	**100%**	**286.6**	**100%**
Estimated post-project annual recurrent costs – current prices	5.0		6.0		11.0	

Annex 6: Implementation Arrangements

INDIA: Hydrology Project Phase II

Implementation Arrangements

1. The Implementing Agencies(IA) at the National level are MoWR, CWC, CGWB, CWPRS, NIH, IMD, CPCB and BBMB. At the State level, the IAs **include** the Irrigation/Water Resources Departments, other Departments responsible for SW and GW activities, and the State-level representatives of the participating Central agencies, where these function in the State concerned. The Institutional Strengthening component will extend across all IAs. The horizontal expansion component will cover the four new States[20] and two Central agencies[21]. The current HP-I States and other Central agencies will benefit from the Vertical extension component (this could also be extended to the four new States depending on their demonstrated results and progress). The proposed organizational structure for the implementation of HP-II is given below:



[20] Himachal Pradesh, Goa, Pondicherry and Punjab.
[21] CPCB and BBMB.

2. A three-**tier** management structure is planned, both at the national (Central) and at the State levels. The highest level is for strategic direction and policy formulation, the second level is for senior level management and review, and the third is the implementation and operational management level [See table below]:

Management Level	**National (Central)**	**States**
Strategic & Policy	NLSC	SLSC
Project Management and Review	HISMG (DD), HISMG (IS), HISMG (Tech)	SHISCC
Operational	HISCS and Project Coordinator of respective Central agencies	Project Coordinator of respective State Hydrology Organization (SHO)*

Starting with existing arrangements, with a long-term objective of unifying within a single HIS agency.

3. **Strategic and Policy Level:** The National Level Steering Committee (NLSC) would be the apex-level body for the project and would exercise overall administrative, management and financial control. It would be chaired by the Secretary, MoWR and include senior representatives of all participating Central agencies, chair-persons of the participating States Level Steering Committees (SLSC), senior representatives of water user departments at Central level, and experts from the water sector. NLSC would monitor HP-II at the national level and would provide strategic and policy directions. The Committee would also be empowered to constitute special purpose Working Group(s) or Task Force(s) to address specific aspects of the project as a time-bound activity with clearly-defined deliverables, by engaging specialists from academia/ industry, as required. NLSC would meet as often as required, with a minimum of twice a year.

4. SLSC will be chaired by the Secretary of the controlling Irrigation or Water Resources Department under which the States' surface and groundwater agencies are placed. In case of separate departments handling SW and GW activities, the State would either nominate a nodal Secretary for HP-II who would function as the Chairperson of SLSC and would represent the State's interest in the NLSC or, alternatively, the Secretary, SW and Secretary, GW would alternately hold the Chairmanship on an yearly rotation basis. In either case, the SLSC would include the other Secretary of the concerned WR Department and the Finance Secretary, as well as regional heads of the participating Central agencies active in the State, senior representatives of selected Water User Departments e.g. Agriculture, Power, Environment and Forest, Urban and Rural Development, Fisheries, etc., and invited experts from the water sector. SLSC will handle all project-related policy and strategy matters related to implementation. The Project Coordinator of the State Hydrology Organization (SHO) would be the Member-Secretary of SLSC. In the case of States where the SW and GW departments are separate, the head of the SHO from either the SW or the GW Departments would function as the Member-Secretary, alternating every year. SLSC would monitor the physical and financial progress of HP-II at the State Level and provide directions at the Strategy, Policy and Project management level.

5. **Management and Review Level:** In order to provide focused advisory support to NLSC and to monitor and review HP-II on its behalf, it is proposed to re-constitute the National Coordination Committee (NCC), the National Hydrology Training Committee (NHTC) and the R&D Evaluation Committee, set up under HP-I, as HIS Management Groups (HISMG). These would be empowered to constitute special purpose Working Groups or Task Forces to address specific aspects of the project as time-bound activities with clearly-defined deliverables by engaging specialists from academia/industry, as required. HISMG would, on behalf of NLSC, undertake focused monitoring and review of the project in

their respective areas and report progress to NLSC. HISMG would also advise the NLSC on policy, standardization and guidelines for best practices. The three HISMG would focus on:

a) **Data-use and Dissemination** (HISMG-DD), covering sub-components on (i) awareness, dissemination and knowledge sharing, (ii) upgrading of data collection network, and (iii) upgrading of data processing and management systems;
b) **Institutional Strengthening and Training** (HISMG-IS), covering activities concerned with Consolidation of HP-I activities, Implementation Support and all training; and
c) **Technology and Technical aspects** (HISMG-Technical) covering the Vertical extension activities and the Purpose-driven studies under the Horizontal expansion component.

6. At the State Level, a State HIS Coordination Committee (SHISCC) would enable better co-ordination between the participating agencies. It would be chaired by the Engineer-in-Chief/Director of the concerned Irrigation or Water Resources Department and, in States where SW and GW IAs report to more than one Secretary, the Chair will rotate annually between the Engineer-in-Chief and Director (Groundwater) as for the SLSC. Membership of SHISCC would be drawn from the participants of HP-II within the State, including representatives of the Central agencies, NIH, CWPRS and IMD. In addition to co-ordination, management and review, SHISCC would ensure compatibility of procedures, formats, protocols, etc. between the Central and State agencies. It would promote Special Interest Groups (SIG) in each State Data Centre that would undertake hydrologic analysis projects, publish the results and distribute them widely, thereby encouraging GW, SW, and WQ specialists to interact and publish their results. The agencies may also constitute, as considered necessary, an empowered committee under the Additional Chief Secretary of the State/Additional Secretary at Central agency level for approving project related procurement.

7. **Operational/Implementation Level:** The HIS Co-ordination Secretariat (HISCS) would be the nodal project management secretariat at Central level with a full-time, multi-disciplinary team and adequate administrative and infrastructure facilities. It would be under the administrative control of MoWR, would be headed by a Commissioner, and would be responsible for monitoring and coordinating project activities. HISCS would also provide the secretariat for and follow-up support to the NLSC and the HISMGs. The Commissioner-HISCS would be suitably empowered to implement the decisions of the NLSC and HISMG. He would be supported by three Director-level staff drawn from MoWR/CWC/CGWB/NIH, each to be the Member-Secretary of one of the HISMG and to be accountable to it for coordinating and monitoring the progress of work of the sub-components identified for that HISMG. The support staff of this team would be made up of full-time representatives from the IAs of MoWR (to start with). HISCS would be assisted, on a full-time basis, by a TA team for both technical and management aspects.

8. It is envisioned that HISCS would evolve from a project-level coordination secretariat to become a HIS Cell. The positioning, role, and staffing of this Cell (including from such non-MoWR agencies as IMD and CPCB), along with a road map for this transition, would be proposed by the Management Consultants during the early part of the project.

9. At the State-level, HP-II activities would be undertaken by the concerned State departments (SW and GW) and Central agencies. Two ultimate goals would be borne in mind: (i) consolidating the SW and GW data centers into a single unified State Water Data Centre to facilitate conjunctive planning of SW and GW; and (ii) creating sustainable State institutions responsible for the HIS and its use. In general, the head of the IA would be designated State Project Coordinator, while in States that have separate SW and GW departments, there would be at most two Project Coordinators (PC). A dedicated full time secretariat within the SHO would be created for facilitating and monitoring the implementation of HP-II activities.

Coordination between IAs would be suitably strengthened through electronic information exchange and computerized MIS.

Hydrology Data Users Group (HDUG)

10. The project would strengthen existing HDUGs and promote their decentralization and growth to division, sub-division and field levels. Membership would be expanded and the HDUGs would be encouraged to network both among themselves and with other international organizations active in similar work. The Central HDUG would assist the State HDUGs, though the SHISCC and the HISMG-D&D, in such initiatives. The HDUGs would also facilitate training to users on data collection, use of hydrology data, water conservation and hold public awareness workshops.

TA Consultants

11. TA consultancies would be financed by the project to provide broad technical and institutional support to all the IAs. The technical consultants' role would be similar to that provided to IAs during HP-I, with emphasis on assisting agencies in the four new States and two Central agencies with the introduction of the standard HIS processes and procedures. The Consultant would also support the HISCC and HISPC at Central level, and the Project Coordinators and SHO at implementation level with a view to their counterparts taking on the role and responsibility of a future Water Information Cell.

12. In addition, Management Consultants would also be provided to support the institutional strengthening activities of the project. The consultants would: review the current institutional framework and recommend process improvements that could improve collaboration between SW, GW, and WQ agencies; introduce organizational development and HR development interventions that promote a culture of collaboration, commitment and creativity and help develop softer skills; formulate strategies for spreading awareness, dissemination and knowledge-sharing with groups that either work in the water sector or use hydrology data and train relevant staff in these skills; plan for effective mass-media interventions, road-shows, creation and content management of hydrology portal/web-site and also formulate marketing strategies for HIS data and information to be made available to water-users.

13. The Management Consultants would also develop and assist with the implementation of a project planning and monitoring system, including M&L procedures, suited to local conditions and including appropriate indicators for monitoring project outputs/outcomes; including those for self-monitoring by various implementing agencies and the HDUGs. This would include features for capturing lessons from HP-II and for developing an effective knowledge management system. The consultants would also advise on the way forward for HISCS to become the nodal agency for managing a HIS through the proposed HIS Cell.

Annex 7: Financial Management and Disbursement Arrangements

India: Hydrology Project - Phase II

1. **Executive Summary:** Hydrology Project – Phase II is a follow-on to the Hydrology Project (HP-I) and will be implemented by the Surface Water (SW) and Ground Water (GW) departments in thirteen States[22] and eight Central Agencies[23]. The proposed lending instrument is a Specific Investment Loan through the IBRD window. The total project cost is estimated at US$135.05 million out of which Bank funding will be US$105.51 million and the balance will be funded by the Government.

2. The project would be able to adequately account for project resources and expenditures. A concise finance manual laying down the financial policies and procedures for the project has been prepared. An important step taken in HP-II is the creation of a Dedicated Finance Desk (DFD) in the Integrated Finance Department of the Ministry of Water Resources to serve in an oversight role in the Project. The DFD is manned by an official of the rank of Deputy Secretary.

3. The implementing States and Central Agencies (IAs) will follow the government's accounting policies and procedures. Under HP-II, it is proposed to enhance the current manual system of recording and reporting expenditures in the implementing SW and GW Departments of two States by instituting a computerized Financial Management System (FMS). This will be web-enabled system and will link the State Finance department with the Finance Wing of the Ministry of Water Resources (MoWR). The FMS would be piloted in two States (to be identified) with adequate staff capacity. This program of computerization is a MoWR initiative, undertaken to strengthen its oversight role. The proposed system is not for generating only FMRs for the project. The proposed computerized system will be used by the departments even after the project is over. However, the existing manual system is considered sufficient to meet the reporting requirements of the project.

4. **Coordination at the Central Level:** The project would be implemented over a period of six years from FY 2004-05. The overall responsibility for the project would rest with the MoWR and, at Central level, the existing National Level Steering Committee (NLSC) would continue as the apex body responsible for overall administrative, management and coordination. This would be chaired by the Secretary, MoWR. The NLSC would be supported by three HIS Management Groups (HISMGs), comprising representatives of the IAs and water user departments/agencies and focusing, respectively, on data use and dissemination (HISMG-DD), institutional strengthening and training (HISMG-IS), and technical (HISMG-Tech.) aspects. The HIS Coordination Secretariat (HISCS) would function as the secretariat for the NLSC and HISMGs and would be the Central nodal management structure responsible for overall project monitoring and coordination. It would be under the administrative control of the Ministry of Water Resources (MoWR), headed by a Commissioner, supported by a full time team of multi-disciplinary staff

5. **Disbursements and Fund Flow**: GOI would open a Special Account with RBI to receive the initial deposit and thereafter reimbursements from the Bank under the project and would make the funds available to the States under the usual Additional Central Assistance (ACA) mechanism. The funds for the project will be budgeted for, in respective IA's budget, including counterpart funds, as an identifiable single-head budget item each year. Funds will flow to the Surface and Ground Water Departments of 13

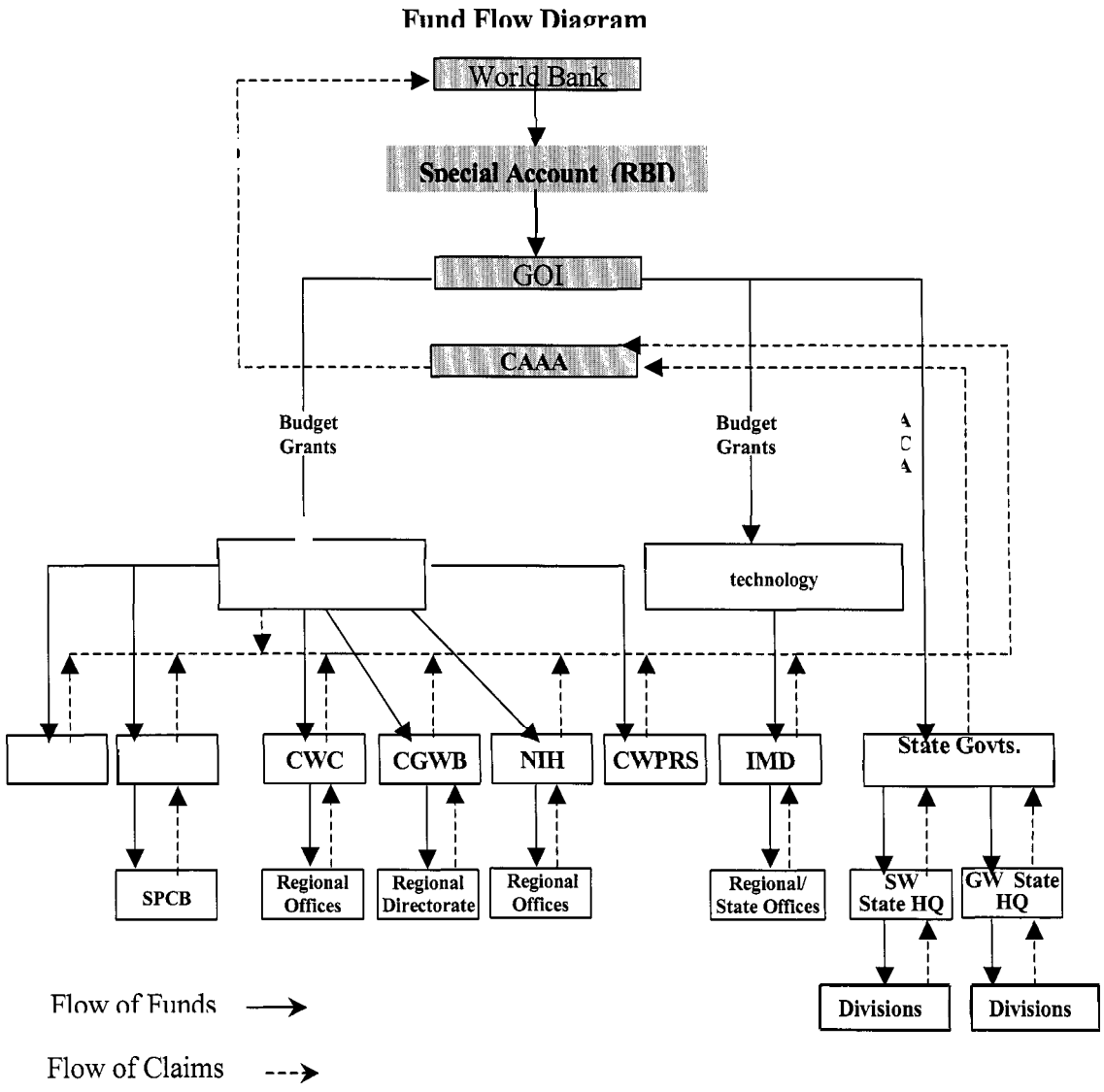
[22] The Project would cover 9 on-going States of HP-I namely Andhra Pradesh, Gujarat, Maharashtra, Karnataka, Kerala, Madhya Pradesh,Chattisgarh, Orissa, and Tamil Nadu; and four new States - Himachal Pradesh, Goa, Pondicherry and Punjab.

[23] The eight Central Agencies are - Ministry of Water Resources (MoWR); Central Water Commission (CWC), Central Groundwater Board (CGWB), National Institute of Hydrology (NIH), Central Water and Power Research Station (CWPRS), India Meteorological Department (IMD), Central Pollution Control Board (CPCB), and Bhakra-Beas Management Board (BBMB).

States and their divisions (district units), and to the eight Central Agencies and their State Units, wherever they exist. All IAs will operate through the government treasury system (apart from the two autonomous Boards, i.e., BBMB and CPCB which have their own Bank Accounts). Funds are proposed to be transferred to these units by MoWR. Disbursements from the Loan would be made in the traditional system of reimbursement with full documentation and against statement of expenditure (SOE). Each Implementing Agency will send monthly claims to CAA&A with a copy marked to HISCS. (Similar arrangement was being followed in HP-I). Each State and Central Agency will get funds based on respective approved work plan and budget. The disbursement under the proposed project is expected to be completed over a seven year period (FY05-FY11). The IBRD funds will be disbursed through the following Categories:

Expenditures Category	**Amount allocated (US$M)**	**Financing Percentage**
1.Civil works	16.10	90%
2. Goods including equipment, machinery, vehicles and materials	32.23	100% of foreign expenditures, 100% local expenditures (ex-factory costs) and 80% of local expenditures for other items procured locally
3. Consultant's services (both domestic and international)	21.20	90%
4.Training	10.16	100%
5. Incremental Operating Costs and incremental salaries	20.69	80% until March 31, 2007 75% until March 31, 2008 60% until March, 31, 2009 50 thereafter
6. Front End Fee	1.05	Vide section 2.04 of the Loan Agreement
5. Unallocated	4.08	
Total	105.51	

The fund flow arrangement is schematized below:



6. **Retroactive Financing:** Retroactive financing not exceeding $6 million would be available to cover eligible expenditure for relevant project activities incurred before the date of loan signature, but after January 1, 2004.

7. **Staffing:** The finance function of the project would be managed by the Financial Advisor of the Integrated Finance Department of the MoWR. He would be assisted by a Dedicated Finance Desk (DFD) This Desk will be interacting and coordinating with HISCS on a regular basis. This team at the Central Ministry would be responsible for establishment of the agreed financial management arrangements and will have an oversight function. At the State/agency level, the agency finance department will be responsible for the finance function. One of the strengths of the HP-II project is that the project is being implemented in nine States and six Central Agencies which had implemented HP-I. Therefore the finance and accounting staff in these States and Central Agencies are conversant with Bank's policies and procedures. However, there are four new States and two new Central Agencies in HP-II where the concerned staff will need to be trained.

8. **Audit:** The accounts of all the IAs will be audited either by the C&AG through the Principal Director of Audit – Economic Services (for Central IAs) or through the Accountant General (Audit) of the respective States (for State IAs) on behalf of the C&AG of India. Draft Terms of Reference (TOR) for the C&AG/AG has been prepared in line with the Bank's new audit policy and will be shortly agreed with C&AG. A general format of the annual project financial statement for all agencies under the project will be agreed. The annual project financial statements, duly audited, will be submitted by all IAs to the DFD which will compile the agency-wise observations and disallowances, and submit to the Bank a compiled report within six months of the end of each fiscal year. The Bank may, wherever required, ask for individual department/agency reports.

The following audit reports will be monitored on Audit Report Controlling System (ARCS).

Audit Report	Implementing Agency	Due date
Project Financial Statements	A single compiled report of 13 States and eight Central Agencies	September 30
Special Account Reconciliation	DEA/GOI	September 30

9. **Internal Financial Review:** In addition to the audit by C&AG, an internal financial review will be conducted by the Finance wing of the MoWR, which has a monitoring role, to assess the operation of the project's financial management system, including a review of internal control mechanisms. Any issues arising in the external and internal audits, including systemic issues, would need to be promptly and timely addressed by the project authorities. A ToR for the internal financial review has been agreed with the Integrated Finance Department.

10. **Information Systems:** The current manual system of recording and reporting expenditures, which is considered adequate to meet the reporting requirements of the project, is proposed to be enhanced by a computerized FMS. This software would be piloted in two States. These two States will be selected by the Implementation Support Consultants based on a few criteria such as staff capacity, management willingness, proactive leadership etc. The system will be web-enabled and will link the State Finance unit with the finance wing of MoWR. The proposed Financial Management System would meet the reporting requirements of: (i) the State SW and GW Departments, in terms of the government's financial rules and Accountant General's requirements; and (ii) project management for monitoring and decision making.

11. A Finance Manual has been prepared for the project by a consultant. The financial management manual would be an integrated one for the whole project. It would document a uniform set of policies, procedures and financial reporting arrangements which could apply to all the IAs. It will include the Chart of Accounts linking budget heads with the project cost table structure, formats of various financial reports, budgeting system, internal control mechanism and the auditing arrangements for the project. A training workshop will be held by MoWR after negotiation where finance personnel of all States and Central Agencies will be trained on the reporting formats laid down in the finance manual.

12. **Reporting and Monitoring:** Financial reporting from IAs to the DFD will be on a monthly basis. The FMR formats are a part of the Finance Manual. DFD will prepare the FMRs in the prescribed format (which is similar to the format of the annual financial statements) on a half-yearly basis, consolidating the information received from the IAs and forward it to the Bank within 45 days of the end of each half year. DFD will use the existing software under HP-I for this purpose although this will need to be customized to meet the expected requirements.

13. **Lessons Learnt from HP-I**: Bank's policies with regard to financial management of projects have evolved over the years and therefore improvements over existing arrangements in HP-I have been suggested in HP-II in keeping with current requirements. In HP-I, the monitoring role of Project Coordinating Secretariat (PCS) in financial management of the project was missing. There was no finance personnel in the PCS. In HP-II this has been taken care of by the proposed involvement of the Integrated Finance Department and providing for a Dedicated Desk for the project in the Finance Wing of the Ministry of Water Resources. Periodic internal financial review by the Integrated Finance Department would further strengthen the system. In HP-I, there was a lack of uniformity in financial reporting as there was no uniform guidelines for the IAs. This is being taken care of by preparing -a financial management manual to standardize the policies, procedures and reporting formats to be followed by all implementing agencies. Another problem faced in HP-I was that of too many audit reports. In HP-II, DFD has been entrusted with the responsibility of following up with the States and Central Agencies to ensure timely submission and also compilation of all audit observations.

14. **Incremental Operating Cost:** Incremental Operating Cost under this project would include incremental salaries, incremental office and O&M costs, hiring of vehicles, traveling and accommodation.

15. **Risk Analysis:**

Risk	Risk Rating	Risk Mitigation Measures
Due to wide geographical spread of the project and the large number of implementing agencies involved, coordination and oversight functions by the Central Ministry will pose a challenge.	H	FM team at the MoWR has been strengthened to monitor the release and use of funds and reporting of expenditures. The involvement of the Financial Advisor and his team and a Dedicated Desk for the project at the Integrated Finance Department of MoWR will strengthen coordination and oversight functions. An internal financial review by the Finance Wing of the MOWR will identify the weak areas to help improve the FM capacity of the agencies.
Since a large number of agencies are implementing the project, there could be lack of uniformity in accounting information	S	To bring about uniformity in policies, procedures and reporting formats, a Financial Management Manual has been prepared.
Going by the experience of HP-I, there is a risk that all audited financial statements may not be furnished to the Bank on time.	S	DFD has been entrusted with the duty of following up and getting audit reports on time so that they can compile and furnish it to the Bank within the due date. Ensuring that six monthly reports are prepared and submitted on time and a careful review of these reports will help mitigate this risk.
Overall risk rating	S	

H - High, S - Substantial, M - Medium, N - Negligible

16. **Financial Covenants**: Besides the usual conditions of audit and FMRs, the following will be required to be included as part of Implementation Program.

(i) MoWR shall maintain throughout the project period a Dedicated Desk in the Integrated Finance Department to handle the finance functions.

(ii) The pilot States for implementation of the financial management software would be identified within three months of the appointment of the management consultant. The consultant for developing the FMS will be employed within six months thereafter. The software will be implemented in one of the two selected Project States not later than December 31, 2007, and in the other Project State not later than December 31, 2008.

(iii) The first internal financial review report shall be submitted to the Bank within the first nine months of project implementation.

18. **Supervision Plan:** The project would require intensive supervision in the initial stages, especially for ensuring successful implementation of the financial management arrangements in the project implementing agencies/departments. The other focus areas during the supervision will be on meeting the training needs of the Project's finance personnel.

Annex 8: Procurement

INDIA: Hydrology Project - Phase II

A. Procurement Implementation Capacity

1. India- Hydrology Project – (Phase I) has been implemented successfully by nine participating States and six Central agencies. There were no major procurement issues other than normal delays in procurement and implementation. Most of the agencies and staff involved in HP-I will continue to be involved in HP-II, and thus they have experience in handling procurement activities under Bank financed projects. Country Procurement Assessment Review (CPAR) has been completed for the Central Government's agencies, and separately for State governments of Karnataka, Maharashtra and Tamil Nadu. Governments of Karnataka and Tamil Nadu have already passed the procurement laws, and the Bank is assisting in their implementation. In addition, the proposed Management Support Consultancy would include a procurement specialist.

2. The Governments of Goa, Himachal Pradesh, Punjab and Union Territory of Pondicherry will benefit from the HP-II. The States of Himachal Pradesh and Punjab have already implemented several Bank financed projects, while the States of Goa and Pondicherry do not have that experience. However these States are following Central Public Works Department (CPWD) procedures for the procurement of works and Director General of Supply and Disposal (DGSD) procedures for the procurement of goods. Therefore the staff that will be involved in the project are generally aware of procurement rules.

3. As indicated above, though most of the officials are by and large conversant with the systems and procedures to be followed for the procurement in Bank financed projects, all the officials implementing this project may not necessarily be the same who have been associated with the earlier Bank financed projects. Further capacity has to be developed in new States for handling procurement under Bank financed projects. The States/Central IAs will carryout most of the civil-works and procurement of goods and services. Government of India has agreed to include a full time procurement specialist under the management support consultancy, who has full background of the Bank's procurement procedures to advise Central institutes and State governments on procurement issues including capacity building of the staff. The consultant would conduct a series of workshops to develop the procurement capacity of the entities who would be implementing the project. In addition, the IAs have agreed to nominate adequate staff to participate in the procurement training conducted by Administrative Staff College of India (ASCI), Hyderabad and National Institute of Financial Management (NIFM), Faridabad. Periodic workshops with participation of procurement specialists from Bank is also proposed.

B. Procurement Rules

4. Goods and works to be financed under the project shall be procured in accordance with the Guidelines for Procurement under IBRD Loans and IDA Credits, May 2004; and Consultants Services financed by the project shall be procured in accordance with Selection and Employment of Consultants by World Bank Borrowers, May 2004. IDA Standard bidding documents including evaluation reports for Procurement under International Competitive Bidding (ICB), and India specific Bank model documents for Procurement under National Competitive Bidding (NCB) which are already being agreed with GOI task force, shall be used for procurement of goods and works under the project. The Bank's Standard Request for Proposal (SRFP) or a modified version with the prior agreement of the Bank, will be used in the selection of Consulting Firms, NGOs and Individual Consultants. A General Procurement Notice (GPN) has been published in the UN Development Business (UNDB). All ICB contracts including pre-

qualification notices and contracts for consulting services estimated cost US$ 200,000 or more will be advertised in UN Development Business (UNDB) on line and in dgMarket of Development Gateway.

C. Procurement Methods (Table A and Table A1)

5. Project would support activities under the three envisaged components, namely, Institutional Strengthening, Vertical Extension and Horizontal Extension.

6. **Civil Works (US$19.9 million):** The project would support construction of new/upgrading river/rainfall gauging stations, full climatic and automatic weather stations, snow gauging stations, discharge measuring weirs, groundwater observation wells, sediment and chemical laboratories of all levels, offices and hydrology data storage and processing center buildings, site stores etc. Most of these contracts will be implemented by concerned States and most of them are estimated to a cost around US$100,000 or less and scattered in a wide geographic spread. Following procurement methods will be used:

(i) **National Competitive Bidding (US$16.8 million):** Civil works contracts estimated to cost more than US$30,000 equivalent would be procured following NCB procedures, in accordance with the provisions of the paragraphs 3.3 and 3.4 of the Guidelines.

(ii) **Shopping (US$3.1 million):** Small works such as new/upgrading of river/rainfall gauging stations etc. estimated to cost less than US$30,000 would be procured following shopping procedures in accordance with paragraph 3.5 of Banks Guidelines. Small works estimated to cost less than US$20,000 each, meeting the requirements of paragraph 3.8 of the Bank's Guidelines, with the Bank's prior approval will be carried out following the Force Account Procedures, as the last resort.

7. **Goods and Equipment: (US$41.3 million):** The project would support the procurement of GIS hardware and software, equipment for hydrological and groundwater measurements, equipment for all type of weather stations, river and rain gauging stations, radars, chemical and sediment laboratory equipment, office and training equipment, computer hardware and software, office furniture and audio-visual equipment, media equipment, communication equipment, inspection and transport vehicles, R&D equipment for water management, satellite imagery and GIS maps, remote sensing and topographic maps, books and periodicals etc. The following procedures would be adopted.

(i) **International Competitive Bidding (ICB) (US$8.4 million):** Contract for Goods estimated to cost US$500,000 or more per contract would be procured following ICB procedures; domestic preference will be available for all ICB contracts;

(ii) **National Competitive Bidding (NCB) (US$17.5 million):** Packages of Goods and Equipment estimated to cost for more than US$50,000 per contract would be procured following NCB procedures in accordance with the provisions of the paragraph 3.3 and 3.4 of the Guidelines

(iii) **Shopping (US$9.6 million):** Packages of Goods and Equipment including vehicles estimated to cost less than US$50,000 per contract would be procured and contracts awarded on the basis of Shopping procedures in accordance with the provisions of paragraph 3.5 of the Guidelines. Only DGS&D rate contracts are acceptable as a substitute for shopping. The rate list of these can however be considered as one of the quotations under the shopping procedures.

(iv) **Direct Contracting (US$5.8 million):** Satellite imagery maps and data, aerial photography, topographical maps, and other proprietary equipment and spares, GIS maps of Government's

remote sensing agency, scientific books, periodicals, software, training material (video, audio, etc.) up to an aggregate of US$5.0 million would be procured following Direct Contracting procedures in accordance with paragraph 3.6 of the Guidelines.

8. All NCB Contracts for works and goods to be financed from the proceeds of the Loan shall follow the following procedures:

(a) Only the model bidding documents for NCB agreed with the GOI Task Force (and as amended from to time) shall be used for bidding.
(b) Invitations to bid shall be advertised in at least one widely circulated national daily newspaper, at least thirty days prior to the deadline for the submission of the bids.
(c) No special preference will be accorded to any bidder when competing with foreign bidders, State-owned enterprises, small-scale enterprises or enterprises from any given State.
(d) Except with the prior concurrence of the Bank, there shall be no negotiation of price with the bidders, even with the lowest evaluated bidder.
(e) Except in cases of force majeure and/or situations beyond the control of the project States, extension of bid validity shall not be allowed without the prior concurrence of the Bank (a) for the first request of extension if it is longer than eight weeks; and (b) for all subsequent requests for extension irrespective of the period.
(f) Re-bidding shall not be carried out without prior concurrence of the Bank. The system of rejecting the bids outside a pre-determined margin or "bracket" of prices shall not be used.
(g) Rate contracts entered into by DGS&D will not be acceptable as a substitute for NCB procedures. Such contracts will be acceptable for any procurement under the national shopping procedures. Procurement of computers and vehicles costing up to $100,000 could also be done through DGS&D.
(h) The two-or-three envelope system will not be used.

9. **Technical Assistance, Studies, Training and Workshops (US$37.5 Million):** Technical Assistance and Consultancy Services would be required for management support, implementation (technical) support, implementation of the DSS planning in all States and Central agencies, and for piloting real time DSS in identified locations, implementation of design aids, special purpose driven studies, services for training and capacity building of staff. Consultants would be selected following Quality Based Selection (QBS), Quality and Cost-Based Selection (QCBS), Single Source Selection (SSS), Fixed Budget Selection and Selection Based on Consultants Qualifications (CQ) methods. Where appropriate Individual Consultants (IC) would also be hired.

10. All the seven major consultancies for (i) management support, (ii) implementation (technical) support, and (iii) implementation of design aids (3 nos), (iv) DSS-Real Time, and (v) DSS-Panning are likely to cost more than US$2 million. The ToRs have been finalized for clearance by the Bank.

11. Auditors for the State would be selected following Quality and Cost Based Selection or Least Cost Method. The ToRs are being finalized. All the other consultancies are estimated to cost less than the equivalent of US$100,000 and would be selected either on Quality Based, QCBS, Least Cost, Sole Source or on the basis of Consultant's Qualification.

D. Disbursement Profile

Project Cost Profile and Corresponding Disbursements

	Project Cost	% of Project Cost	Corresponding Disbursements[24]	% of World Bank Financing
Year 1	13.18	11.71%	5.73	5.43%
Year 2	33.16	24.55%	21.43	20.31%
Year 3	31.07	23.01%	28.05	26.59%
Year 4	24.41	18.07%	23.01	21.81%
Year 5	17.17	12.71%	14.75	13.98%
Year 6	16.06	9.94%	12.54	11.88%
Total	**135.05**	**100.00%**	**105.51**	**100.00%**

E. Assessment of Borrowers Readiness to Implement the Project. The draft detailed schedule for procurement during the first 18 months is ready and is being revised by the borrower in the light of the discussion during the appraisal mission. Draft ToRs for major consultancies prepared by the borrower are also being finalized and draft RFPs under preparation. The borrower is planning to issue the general procurement notice shortly. The implementation arrangements in the existing agencies are in place to take up initial activities and so also in the new States. Therefore, the borrower is in a state to initiate project activities.

F. Review by the Bank of Procurement Decisions

Procurement Planning: The proposed Procurement Plan for the project has been furnished to the Bank for its review and approval in accordance with the provisions of paragraph 1 of Appendix 1 to the Guidelines. Procurement of all Goods shall be undertaken in accordance with Procurement Plan as shall have been approved by the Bank and with the provisions of said paragraph 1. Annual Implementation plans for works and Procurement Plans shall be reviewed by the Bank.

Prior Review: All ICB contracts for goods estimated to cost more than US$500,000 will be subject to prior review. First NCB contract for Goods estimated to cost more than US$50,000 equivalent and the first contracts for works estimated to cost more than US$30,000 equivalent in each implementing agency and all goods and works contracts estimated to cost US$500,000 equivalent or more will be subject to prior review by the Bank as per provisions set forth in paragraphs 2 and 3 of Appendix 1 of the Bank Guidelines. All consultancy contracts with firms of value more than US$200,000 and with individuals of value more than US$50,000 would be subject to prior review as per provisions set forth in paragraphs 2 and 3 of Appendix 1 of the Bank Consultancy Guidelines.

Post review: The contracts below the prior review threshold for Works, Goods and Consultancy contracts shall be subject to post review as per procedure set forth in paragraph 5 of Appendix 1 of the Bank Guidelines and Bank Consultancy Guidelines. Post award reviews on the India portfolio as a whole, Bank staff would conduct post award review during supervision missions.

[24] Occurring with a delay corresponding to claim and reimbursement processes.

G. Procurement Information: Procurement information would be collected and recorded as follows:

(a) Prompt reporting of contract award information by;
(b) Comprehensive semi-annual reports by indicating:
  (i) revised cost estimates of individual contracts and the total project;
  (ii) revised timings of the procurement actions including advertising, bidding, contract award, and completion time for individual prior review contracts;
  (iii) compliance with aggregate limits on the specified methods of procurement.
(c) Completion report by the Borrower within three months of the Credit closing date.

H. Proposed Procurement Arrangements

The project elements, their estimated costs, and proposed methods of procurement has been summarized in Table A. Figures in parenthesis are the respective amounts to be financed by the IDA/Bank.

Category of Expenditure	ICB	NCB	Other[2]	N.B.F.	Total Cost
1. Works		16.8 (15.1)	3.1 (2.8)		19.9 (17.9)
2. Goods	8.4 (7.4)	17.5 (15.2)	15.4 (13.2)		41.3 (35.8)
3. Services			26.2 (23.5)		26.2 (23.5)
4. Training and workshops			11.3 (11.3)		11.3 (11.3)
5. Incremental Operating Costs, including Incremental Salaries			36.4 (17.0)		36.4 (17.0)
Total	8.4 (7.4)	34.3 (30.3)	92.4 (67.8)		135.1 (105.5)

Table B: Thresholds for Procurement Methods and Prior review

Expenditure Category	Contract Value Threshold (US$ millions)	Procurement Method	Contracts Subject to Prior Review
1. Works	(i) All contracts of value more than US$ 30,000 equivalent	National Competitive Bidding	Fist contract of each IA and all contracts above US$500,000 equivalent
	(ii) Contracts of value <= US$30,000 equivalent	Shopping with public bid opening	None. All contracts Post Review
2. Goods	(i) Contracts of value >= US$500,000 equivalent	International Competitive Bidding	All contracts above US$500,000
	(ii) Contracts of value >= US$50,000 equivalent and <US$500,000 equivalent	National Competitive Bidding	First contract of each IA
	(iii) Contracts of value less than US$ 50,000	Shopping	None. All contracts Post Review
	(iv) Contracts of value less than US$10,000 equivalent and propriety data items of government agencies	Direct Contracting	None. All contracts Post Review
3.Consulting Services	(a) Firms (i) Contracts >= US$200,000 equivalent	Quality Based Selection (QBS), Quality and Cost Based Selection (QCBS)	All contracts
	Contracts < US$200,000 and >= US$100,000	QCBS, SBCQ, Fixed Budget Selection and Least Cost selection	All contracts
	(ii) Contracts < US$100,000	QCBS, SBCQ, Fixed Budget Selection and Least Cost selection	None. All contracts Post review; but ToR to be prior reviewed .
	(b) Individual Consultants: (i) Contracts >= US$50,000 equivalent	In accordance with Section V of the Consultants guidelines	All Contracts
	(ii) contracts < US$50,000 equivalent	In accordance with Section V of the Consultants guidelines	None. All contracts Post review; TOR to be prior reviewed

Total value of contracts subject to prior review: US$30 million.

Overall Procurement Risk Assessment: Average at the Central level and the nine States participated in HP-I, and "High" for all new States and agencies.

Frequency of procurement supervision missions proposed: One every six months (includes special procurement supervision for post-review/audits).

Annex 9: Economic and Financial Analysis

INDIA: Hydrology Project Phase II

Three types of benefits are expected to be generated by HP-II activities:

a) At Central level: improved water resources assessment, the use of standardized planning and design procedures; improved technical basis for project review and approval; support for development and implementation of the national and state water policies; improved inter-State coordination on related sector issues; optimal water resource management; and increased awareness of data availability and improved uses of data among all water users;
b) In new and existing States: improved design of water-related infrastructures; improved groundwater management; reduced impact of poor water quality on public health; improved state water policies and regulations; and improved awareness; and
c) In existing States and BBMB only: improved water resource planning; reduced vulnerability to and enhanced management of drought and floods; and improved management of reservoirs. Improved flood management will, in particular, result in reductions of both damage to public and private infrastructure and property, and human life losses;

Improved flood management, more accurate drought relief programmes, improved drinking water quality, will, among other project outcomes, directly benefit the poor and the poorest.

Though data use is still to be strengthened, HP-I implementing agencies have demonstrated direct benefits of HIS activities. Data use in academic research is reported by all agencies. Central and ground water agencies are extensively using HIS data for revising assessments of groundwater availability (using Groundwater Estimation Committee, 1997 norms), and preparing groundwater maps. These are used as a basis for groundwater planning at district and sub-district levels. Some States have also reported policy, design and administrative actions arising from the implementation of the HIS. These include: support to the groundwater regulatory authority in Maharashtra, Andhra Pradesh, Karnataka, Kerala and Tamil Nadu; the development of a comprehensive ground water bill in Tamil Nadu; the proposed Maharashtra Water Planning and Regulation Authority; drought monitoring and drought proofing in Andhra Pradesh; to plan lower Kolar, Parwathi and Kalisindh dams in Madhya Pradesh; river flow diversion studies in Mahadayi river between Goa and Karnataka; master plan revision for basins in Madhya Pradesh; regulating power connection to wells by Rural Electrification Corporation in Madhya Pradesh, urban pollution surveillance in two cities in Madhya Pradesh, action against industrial polluters in Karnataka, Tamil Nadu, Kerala and other States; monitoring high fluoride and nitrate areas in many States, financial institutions lending and provision of electrical connections to agricultural pumpsets (based on level of GW utilization), investments (HIS triggering the ambitious "Neeru - Meeru" programme of about Rs. 20 billion size and direct investment of Rs. 80 millions for additional Digital Water Level Recorders (DWLRs) at each micro-basin, and supporting notifying areas for groundwater regulation under Water, Land and Trees Act in Andhra Pradesh State; integrated river basin studies in Sabarmati in Gujarat and lower Godavari basin in Andhra Pradesh) and operational management (real time river level data for flood forecasting in Mahanadi in Orissa, monitoring groundwater scarcity in Maharashtra and Andhra Pradesh, etc) directly resulting from appreciation and use of HIS data.

It is expected that establishing the HIS data base (horizontal expansion) and strengthening HIS data use (vertical extension) will, among other impacts, directly contribute to reducing investment and maintenance costs in the water sector (through improved designs and operation of water-related infrastructure). HP-II total base costs at state level, for the six years of the project, account for an estimated 4 percent and 27 percent of the annual Irrigation Departments' planned budgets, in the existing

and new States, respectively (0.7 percent and 4.5 percent per year). Thus, a nominal reduction in the investment costs for irrigation and flood control works alone would be sufficient to both justify economically the project's investments and ensure its positive impact on Central agencies' and participating States' budgets.

Even though the project's expected benefits can be qualitatively described, their specific quantification is not feasible at this stage as it is not possible to estimate the value of India's existing hydrological data, or to quantify the marginal benefit of an improvement to the hydrological data base and data use resulting from project investments. No specific investigations have been conducted under HP-I to quantify HIS benefits. Even world-wise, such analysis remains very rare. Most existing analyses describe socio-economic benefits and assess the economic value of weather or climatic forecasts[25] - and, rarely, hydrologic data (studies directly related to hydrological information deal, for example, with impact on agriculture of improved irrigation management - in relation with weather forecasts; flood forecasting[26]; electric power generation; etc.). These studies are based on mathematical models as well as monitoring systems, and usually include surveys of (and/or interviews with) data users. Most of such studies were conducted under socio-economic conditions prevailing in developed countries (in particular in the United States) due, in large measure, to the availability of models and data[27]. However, the importance of such analyses in developing countries such as India is widely recognized at international level as well as local level by both technicians and administrators. During the preparation of the ICR for HP-I, the implementing agencies clearly recognized the need for demonstrating and publicizing HIS benefits.

HP-II would therefore implement a monitoring and assessment mechanism for both monitoring data use, and identifying and assessing socio-economic benefits, based on four complementary steps:

- Step 1: *Systematic registration[28] and analysis of data requests*. Staff in charge of HIS data dissemination would systematically register data requests in a simple, standardized database. The list of registered requests would be analyzed on a 6-monthly basis. In addition, reports automatically generated by the data base would support this analysis, providing such information as the number of data requests per period, the main data users (e.g. public/NGOs/consulting firms) and types of data requested, the location, trends, time lag between data request and provision, etc. This analysis will help improve data dissemination and assist in building an awareness strategy, as it will contribute to identifying major trends and gaps (potential users not requesting data, data requested and available or not under a format responding to users' needs, etc.). This step will document data dissemination and also serve to support project monitoring and discussions with data user groups.

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[25] E.g. impact of climate forecasts on agricultural production.

[26] E.g. *The benefits of hydrologic forecasting*; Eugene A. Stallings; US Department of Commerce, 1997. This analysis concluded, on the basis of local case studies and overall assumptions, that total benefits from National Weather Service hydrologic forecast, including flood mitigation and with expected modernization in place, were estimated at US$ 2.1 billion annually (US$ 677 million from improved water resource management and long-range forecast expected to derive from the proposed Advanced Hydrology Prediction System when fully implemented; US$ 200 million for flood mitigation and US$ 477 million for other water resources purposes). This study also mention that: *"the People's Republic of China Water Resources Commission estimated that the disaster reduction benefits from hydrological forecasting was US$ 1 billion in the 1995 flood and US$ 1.76 billion during the 1996 flood. (...) Approximately 3.4 million persons were safely evacuated as a result of the accuracy of the hydrologic forecasts."*

[27] Economic benefits of climate forecasts are mentioned to be "virtually undefined" in Asia, in *The socio-economic benefits of climate forecasts: literature review and recommendations*; World Meteorological Organization, Global Climatic Observation System, Working group on socio-economic benefits; 1995.

[28] Systematic registration of data requests was already implemented by most of the agencies under HP I but little analysis has been conducted on this basis.

- Step 2: *Regular documentation of data use.* This would mostly aim at identifying actual use of data provided, on the basis of brief interviews with registered data users[29]. This exercise would be conducted 6-monthly or annually (depending on the number of requests), if possible with the support of students. Information on data use will follow a standardized analytical structure, to allow for compilation at State and national levels. Individual interactions with data users will also permit to collect feedbacks on data availability and presentation.

- Step 3: *Case studies analyzing HIS benefits.* Studies assessing social, financial and economic benefits of using HIS information will be conducted in each State, on a few cases representing major data uses (e.g. evaluating the effect of using HIS data on the design of a substantial water resource development structure, and comparing the result - in term of staff inputs, construction costs, number of water users, irrigated areas, increased safety, etc. - with the original design using pre-HIS data[30]). This will be done in partnership with data users, and consultants or researchers in economics and sociology (e.g. though partnerships with universities and colleges). Methodologies for such studies will be developed locally on the basis of overall guidelines provided by the management consultants responsible for assisting project implementation. Existing studies on benefits of incremental information (e.g. climatic forecasts) can also be used as a methodological basis for specific investigations to be conducted under HP-II.

- Step 4: *Consolidation of case studies at national level.* Thematic and global consolidation of local case studies (together with studies conducted abroad in similar contexts, if available) could be conducted at national level, using data use documentation (step 2) as a basis for extrapolation. This would give an overall estimate of HIS benefits.

Fiscal Impact:

HP-II is likely to have both a positive impact and a negative impact on the States/Central budgets. Post-project recurrent costs related to HP-I and HP-II activities are estimated at some US$5.0 million[31] and US$6.0 million, respectively, in current prices terms; two-thirds of which correspond to incremental staff costs and one-third to incremental operation and maintenance costs.

The sustainability of HIS system will also require continued training[32]. However, these additional requirements account for only a very small fraction of the implementing agencies non-planned budget. Moreover, this additional expenditure will be more than offset by the positive fiscal impact of HP-II on the Central/State budgets due to reduction of expenses related to sub-optimal water structure design, flood and drought relief, public health (improved water quality), etc.

A data pricing policy was developed and adopted by most of the implementing agencies under HP-I[33]. This policy will continue to be applied and further improved under HP-II. It will be particularly important to develop a policy framework for pricing processed data, as HIS implementing agencies will be providing customized products to answer specific users' needs. However, the pricing policy should not limit data use and data sharing as these are the main objectives of the project. A close monitoring of data use and periodic interactions with data users will help adapt the pricing policy.

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[29] E.g. "data corresponding to the request number XY was used for the design of a dam, serving 500 ha and 1,000 farmers; this dam is presently under construction".

[30] Data priced at a nominal rate, as per the national policy.

[31] Estimate based on HP I recurrent costs in the last year of implementation (i.e. 2003).

[32] As well as replacement of specialized equipment.

[33] At a nominal rate, with exemptions for specific users such as universities.

With regards to HP-I financial sustainability, most HP-I implementing agencies have prepared post-project operation plans, with associated budget submissions, and assurances have been given regarding the availability of budget lines and financial approval[34]. Such post-project operation plans include continuation of HIS staff, operation and maintenance of equipment and systems installed or upgraded under HP-I (including maintenance of software), operation of help desk, and continuous training programmes on HIS activities. Some agencies have more ambitious post-project operation plans including, for example, the restructuring of monitoring networks as per users' needs and technical requirements, publication of HIS data, public awareness campaigns, scientific workshops, and specific studies.

Some reservations exist with regard to staff availability in a number of agencies and, although assurances were received that such staff will continue to work in HIS operations, doubts remain as to whether they will not be redeployed elsewhere. In such cases, governments' willingness to allocate human and financial resources required for HIS in the medium and long-term will mostly depend on the demonstration of data use and increasing data users' demand, the main targets for HP-II.

[34] Some agencies have even prepared five years post-project operation plans to be included in the recent Xth five year plan.

Step	Objective	Timing	Scope	Implementation responsibility	Source of information	Methodology*	Example
1- Registration & analysis of data requests	To document data dissemination. To identify major trends and gaps (Are we serving all potential users?, etc.). To strengthen HIN assessment. To improve data collection and packaging, and data users targeting.	- Registration: immediate	Systematic	Data centre staff responsible for data dissemination		Common format (simple data base)	Request for SW and hydrometeorology data by the State water resources dept. planning and design unit.
		- Analysis: 6-monthly	Systematic	Data centre staff responsible for data dissemination	Register of data requests	Common analytical structure	Such data = 32% of the requests. Number increased by 24% in the last year. This user = 12% of the requests.
2- Documentation of data use	To document data use. To identify potential project benefits. To further characterize data users needs (in particular regarding processed data).	6-monthly	Systematic	Students together with data centre staff responsible for data dissemination (staff/consultant)	Register of data requests + interviews with data users	Common guidelines	Design of a dam, with a command area of 500 ha and benefiting to 1000 farmers (under construction)
3- HIS benefit analysis – case studies	To assess and document project benefits on sample cases. To promote HIS sustainability and strengthening.	To be started as soon as possible in HP I participating agencies	On a few cases representing major data uses	Experts (researchers, students, consultants - economists & sociologists) together with data users and HP staff	Documentation of data use; primary data users (planning and design units, etc.) and beneficiaries of data use	Case specific (based on overall guidelines + existing case studies on benefits of incremental information)	Due to HIS information for design of major WR systems/structures XX crores Rs were saved (comparison between situations with and without HIS information)
4- HIS benefit analysis – consolidation of case studies at national level	To get some overall estimate of the project benefits. To promote investments in HIS sustainability and strengthening.	Once	Various thematic consolidations	Experts together with Central agencies	All the case-studies available on a given theme (ex flood forecasting) + documentation on data use (basis for extrapolation)	Specific (based on similar studies conducted abroad, when available)	
			One global consolidation	Experts together with Central agencies	All the case-studies available	Specific	

*: All methodologies will evolve on the basis of local experiences and recommendations from the management consultants responsible for assisting the project implementation.

Annex 10: Safeguard Policy Issues

INDIA: Hydrology Project Phase II

Social

The use of hydrological and climate data is common to both governmental and non-governmental sectors. Although, many of the non-governmental sectors including individual citizen of the country will not be directly involved in the project implementation, creation of Hydrologic Data User Groups (HDUG), opening access to the Data Storage Centers, conducting public awareness campaigns will have positive impact on the livelihood of the people at all level. Given that the ultimate aim of the project is to create an easily accessible hydro-meteorology database for the common public, it is important for the effectiveness of the HDUG forum and the community consultation in data collection as parts of the project. The project will have a positive impact on the social sector in long run by having a reliable HIS in all States and the Central agencies.

Environment

There are not expected to be any significant negative environmental or social consequences of the project and any construction/installation impacts are expected to be very localized, temporary and not significant. In fact, the project interventions and outcomes will contribute to better overall sustainable environmental management through generating: (i) a reliable and accessible hydrological knowledge base of meteorology, surface and ground water resources and water quality; (ii) promotion of use of hydrological models and analytical tools such as decision support systems to mainstream environmental issues in water resources planning and management; and (iii) promotion of special-purpose studies on critical issues on environmental issues in the water sector such as on pollution of surface and ground waters and resource conservation. The databases and analytical tools developed by the project should also help in the enhancement of dam safety in many basins. In particular, the project proposes to help coordinate the work of various agencies (e.g. water agencies, environmental agencies) on water quality data generation, management and use. In particular, the Central Pollution Control Board will be strengthened to create a water quality data center and create appropriate analytical tools to use these data, promote training and outreach and harmonize water quality measurement, analysis and reporting protocols.

Annex 11: Project Preparation and Supervision

INDIA: Hydrology Project Phase II

	Planned	Actual
PCN review	August 18, 2003	August 18, 2003
Initial PID to PIC	September 20, 2003	September 12, 2003
Initial ISDS to PIC	September 26, 2003	September 16, 2003
Appraisal	April 12, 2004	April 12, 2004
Negotiations	May 17, 2004	June 28, 2004
Board/RVP approval	August 24, 2004	
Planned date of effectiveness	November 30, 2004	
Planned date of mid-term review		
Planned closing date	February 28, 2011	

Key institutions responsible for preparation of the project:

FAO/ CP:

Michael Fitzpatrick	Team Leader-Water Resources Consultant
Elen Lamaitre	Project Economist
S. T. Chari	Remote Sensing/GIS Specialist
B. Popkin	Groundwater Specialist,
Dr. Seth/Jagdish Anand	Institutional Specialist,
Dr. Aris Gogeokakis	DSS specialist and modeler;

Bank staff and consultants who worked on the project included:

Name	Title	Unit
Bank Staff		
E.V. Jagannathan	Task Team Leader	SASAR
Prabir Joardar	Senior Irrigation Engineer	SASAR
N. Harshadeep Rao	Water Resources/GIS Specialist	SASES
Deepal Fernando	Procurement Specialist	SARPA
Papia Bhattacharya	Financial Management Specialist	SARFM
Sara Gonzalez Flavell	Legal Counsel	LEGMS
Raj Soopramanien	Legal Counsel	LEGMS
John Prakash	Program Assistant	SASAR
Deborah Ricks	Program Assistant	SASAR
Jacqueline Julian	Program Assistant	SASAR
Bank Consultants:		
Ohn Myint (ex-Bank Staff)	Water Resources Engineer	Consultant
Riaz Hasan	Hydrology Engineer	Consultant
Richard Paulson	Hydrological Network Specialist	Consultant
Peer Reviewers:		
R. Paulson (ex-USGS),	Hydrometry and Institutional Specialist	Consultant
L. Simpson (ex-Bank staff)	River Basin Specialist	Consultant
M. Ahmed (Bank)	Lead Water Resources Specialist	

Bank funds expended to date on project preparation:

1. Bank resources: US$220,000
2. Trust funds/FAO: US$278,000 million
3. Total: US$498,000 million

The project of this complexity and size involving aspects related to organizational development, change in business processes, technological changes, knowledge management and geographic spread and multiplicity of agencies requires supervision through a mix of expertise related to the domains (surface water, groundwater and water quality), management specialist, institutional specialist, instrumentation specialist, database management specialist, water resources system planner and modeler etc. Ordinarily the supervision mission will be for a minimum of three staff weeks based on part field supervision and part review through the progress reports prepared by the agencies/consultants. The supervision cost per mission will also be at least twice the normal supervision cost for a single State project. Innovative approach of process monitoring by the Management Consultant and establishment of proper MIS at PCS could shorten the timing required for progress monitoring by supervision missions in long run.

Estimated Approval and Supervision costs:

1. Remaining costs to approval: US$20,000
2. Estimated annual supervision cost: US$100,000

Annex 12: Documents in the Project File

INDIA: Hydrology Project Phase II

Bank documents:

1. Project Concept Note
2. India: Country Assistance Strategy (2002)
3. India: Country Assistance Strategy (2002)
4. India: Principles of engagement for Bank involvement in irrigation and drainage (July 2003)
5. World Bank: Water Sector Strategy (February 2003)
6. Hydrology Project: Implementation Completion Report (May 12, 2004)
7. Working Papers on:
    a. Decision Support System (DSS) for Integrated Water Resources Management: Design and Implementation (September 2003)
    b. Technology Upgrading in Satellite Remote Sensing Services (SRS) and GIS in Hydrology Project-II. (September 2003)
    c. Institutional Options in Hydrology Project II (September 2003)
    d. Proposed Groundwater Activities (September 2003)
    e. Institutional Strengthening and Implementation (February 2004)
    f. Development of Hydrological Design Aids (February 2003)

Borrower Document

1. Project Implementation Plan (June 2004)
2. India: National Water Policy (April 2002)

Others

1 Hydrology Project Technical Assistance, Final Report (June 2003)

2. Review of Technical Assistance, Final Evaluation Report (April 2003)

Annex 13: Statement of Loans and Credits

INDIA: Hydrology Project Phase II

Project ID	FY	Purpose	Original Amount in US$ Millions				Cancel.	Undisb.	Difference between expected and actual disbursements	
			IBRD	IDA	SF	GEF			Orig.	Frm. Rev'd
P078550	2004	Uttaranchal Watershed	0.00	70.00	0.00	0.00	0.00	68.53	0.00	0.00
P050655	2004	Rajasthan Health Systems	0.00	89.00	0.00	0.00	0.00	89.76	0.00	0.00
P055459	2004	ELEMENTARY EDUCATION	0.00	500.00	0.00	0.00	0.00	487.40	0.00	0.00
P082510	2004	Karnataka UWS Improvement	39.50	0.00	0.00	0.00	0.00	39.50	0.00	0.00
P073369	2004	MAHAR RWSS	0.00	181.00	0.00	0.00	0.00	182.70	0.33	0.00
P073776	2004	ALLAHABAD BYPASS	240.00	0.00	0.00	0.00	0.00	240.00	0.00	0.00
P079865	2004	GEF Biosafety Project	0.00	0.00	0.00	1.00	0.00	0.90	0.00	0.00
P072123	2003	Tech/Engg Quality Improvement Project	0.00	250.00	0.00	0.00	0.00	263.37	5.80	0.00
P071272	2003	AP RURAL POV REDUCTION	0.00	150.03	0.00	0.00	0.00	148.09	10.33	0.00
P067606	2003	UP ROADS	488.00	0.00	0.00	0.00	0.00	463.23	31.37	0.00
P050649	2003	TN ROADS	348.00	0.00	0.00	0.00	0.00	344.52	-3.48	0.00
P073094	2003	AP COMM FOREST MANG	0.00	108.00	0.00	0.00	0.00	116.47	5.61	0.00
P075056	2003	Food & Drugs Capacity Building Project	0.00	54.03	0.00	0.00	0.00	56.66	0.00	0.00
P076467	2003	Chatt DRPP	0.00	112.56	0.00	0.00	0.00	117.44	0.18	0.00
P069889	2002	MIZORAM ROADS	0.00	60.00	0.00	0.00	0.00	58.34	2.74	0.00
P040610	2002	RAJ WSRP	0.00	140.00	0.00	0.00	0.00	149.56	25.18	0.00
P050668	2002	MUMBAI URBAN TRANSPORT PROJECT	463.00	79.00	0.00	0.00	0.00	510.31	37.09	0.00
P050647	2002	UTTAR PRADESH WATER SECTOR RESTRUCTURING	0.00	149.20	0.00	0.00	0.00	159.94	49.72	0.00
P050653	2002	KARNATAKA RWSS II	0.00	151.60	0.00	0.00	0.00	163.80	16.20	0.00
P071033	2002	KARN TANK MGMT	0.00	98.90	0.00	0.00	0.00	109.52	9.15	0.00
P072539	2002	KERALA STATE TRANSPORT	255.00	0.00	0.00	0.00	0.00	229.87	-0.13	0.00
P074018	2002	Gujarat Emergency Earthquake Reconstruct	0.00	442.80	0.00	0.00	0.00	362.59	259.22	0.00
P038334	2001	RAJ POWER I	180.00	0.00	0.00	0.00	0.00	107.92	69.76	0.00
P059242	2001	MP DPIP	0.00	110.10	0.00	0.00	0.00	104.85	31.70	0.00
P055455	2001	RAJ DPEP II	0.00	74.40	0.00	0.00	0.00	60.05	3.79	0.00
P055454	2001	KERALA RWSS	0.00	65.50	0.00	0.00	0.00	61.01	16.38	-7.36
P050658	2001	TECHN EDUC III	0.00	64.90	0.00	0.00	0.00	54.28	19.70	0.00
P071244	2001	Grand Trunk Road Improvement Project	589.00	0.00	0.00	0.00	0.00	494.21	199.88	0.00
P035173	2001	POWERGRID II	450.00	0.00	0.00	0.00	0.00	274.65	106.12	-4.66
P067543	2001	LEPROSY II	0.00	30.00	0.00	0.00	0.00	8.45	2.25	0.00
P010566	2001	GUJARAT HWYS	381.00	0.00	0.00	0.00	0.00	283.29	147.62	-6.86
P070421	2001	KARN HWYS	360.00	0.00	0.00	0.00	0.00	302.80	67.80	0.00
P067216	2001	KAR WSHD DEVELOPMENT	0.00	100.40	0.00	0.00	0.00	108.01	38.55	0.00
P050657	2000	UP Health Systems Development Project	0.00	110.00	0.00	0.00	0.00	95.89	30.39	0.00

P009972	2000	NATIONAL HIGHWAYS III PROJECT	516.00	0.00	0.00	0.00	0.00	385.38	198.04	0.00
P050667	2000	UP DPEP III	0.00	182.40	0.00	0.00	0.00	67.60	54.50	0.00
P059501	2000	IN-TA for Econ Reform Project	0.00	45.00	0.00	0.00	0.00	38.89	11.51	0.00
P067330	2000	IMMUNIZATION STRENGTHENING PROJECT	0.00	142.60	0.00	0.00	0.00	31.44	24.96	0.00
P055456	2000	IN-Telecommunications Sector Reform TA	62.00	0.00	0.00	0.00	0.00	48.81	45.49	0.00
P010505	2000	RAJASTHAN DPIP	0.00	100.48	0.00	0.00	0.00	90.92	53.11	0.00
P035172	2000	UP POWER SECTOR RESTRUCTURING PROJECT	150.00	0.00	0.00	0.00	0.00	25.92	17.25	0.00
P045049	2000	AP DPIP	0.00	111.00	0.00	0.00	0.00	83.03	19.98	0.00
P049770	2000	REN EGY II	80.00	50.00	0.00	0.00	0.00	111.88	49.14	7.70
P041264	1999	WTRSHD MGMT HILLS II	85.00	50.00	0.00	0.00	0.00	46.78	40.30	0.00
P045050	1999	RAJASTHAN DPEP	0.00	85.70	0.00	0.00	0.00	48.36	70.80	0.00
P045051	1999	2ND NATL HIV/AIDS CO	0.00	191.00	0.00	0.00	0.00	79.56	49.84	0.00
P050637	1999	TN URBAN DEV II	105.00	0.00	0.00	0.00	0.00	25.42	16.32	0.00
P050646	1999	UP SODIC LANDS II	0.00	194.10	0.00	0.00	0.00	93.14	71.84	0.00
P050651	1999	MAHARASH HEALTH SYS	0.00	134.00	0.00	0.00	16.96	76.27	79.29	0.00
P035827	1998	WOMEN & CHILD DEVLPM	0.00	300.00	0.00	0.00	0.00	179.39	136.33	0.00
P010561	1998	NATL AGR TECHNOLOGY	96.80	100.00	0.00	0.00	0.00	62.77	67.79	-10.69
P035824	1998	DIV AGRC SUPPORT	79.90	50.00	0.00	0.00	0.00	24.31	26.07	19.67
P010496	1998	ORISSA HEALTH SYS	0.00	76.40	0.00	0.00	0.00	56.68	44.26	0.00
P049477	1998	KERALA FORESTRY	0.00	39.00	0.00	0.00	0.00	12.42	12.01	0.00
P038021	1998	DPEP III (BIHAR)	0.00	152.00	0.00	0.00	0.00	99.97	94.88	-4.07
P049385	1998	AP ECON RESTRUCTURIN	301.30	241.90	0.00	0.00	0.00	167.23	166.93	0.00
P035158	1997	AP IRRIGATION III	175.00	150.00	0.00	0.00	45.00	53.30	105.78	29.11
P010473	1997	TUBERCULOSIS CONTROL	0.00	142.40	0.00	0.00	0.00	73.58	82.19	77.98
P010531	1997	REPRODUCTIVE HEALTH1	0.00	248.30	0.00	0.00	0.00	69.58	65.11	65.15
P009995	1997	STATE HIGHWAYS I(AP)	350.00	0.00	0.00	0.00	0.00	49.81	49.81	-204.19
P010511	1997	MALARIA CONTROL	0.00	164.80	0.00	0.00	46.50	48.86	96.63	8.15
P044449	1997	RURAL WOMEN'S DEVELOPMENT	0.00	19.50	0.00	0.00	6.72	6.06	13.95	-4.28
P043728	1997	ENV CAPACITY BLDG TA	0.00	50.00	0.00	0.00	0.94	5.90	11.49	0.00
P009584	1997	ECODEVELOPMENT	0.00	0.00	0.00	0.00	2.34	0.96	4.65	0.00
P036062	1997	ECODEVELOPMENT	0.00	28.00	0.00	20.00	5.86	2.95	10.53	5.53
P010529	1996	ORISSA WRCP	0.00	290.90	0.00	0.00	0.00	50.09	74.39	39.50
P035170	1996	ORISSA POWER SECTOR	350.00	0.00	0.00	0.00	95.00	46.58	141.58	20.09
P010485	1996	HYDROLOGY PROJECT	0.00	142.00	0.00	0.00	19.64	7.82	48.75	25.10
P010480	1996	BOMBAY SEW DISPOSAL	167.00	25.00	0.00	0.00	22.00	9.27	33.39	7.20
P035825	1996	STATE HEALTH SYS II	0.00	350.00	0.00	0.00	0.00	33.21	70.18	0.00
P010522	1995	ASSAM RURAL INFRA	0.00	126.00	0.00	0.00	0.00	17.14	33.93	30.80
P010461	1995	MADRAS WAT SUP II	275.80	0.00	0.00	0.00	189.30	6.63	195.93	4.80
P010476	1995	TAMIL NADU WRCP	0.00	282.90	0.00	0.00	25.01	21.32	85.97	54.86
		Total:	6,587.30	6,456.80	0.00	21.00	475.27	8,150.24	3,658.15	153.53

COUNTRY
STATEMENT OF IFC's
Held and Disbursed Portfolio
In Millions of US Dollars

		Committed				Disbursed			
		IFC				IFC			
FY Approval	Company	Loan	Equity	Quasi	Partic.	Loan	Equity	Quasi	Partic.
2002/03	ATL	2.98	0.00	0.00	0.00	2.44	0.00	0.00	0.00
2003	Alok	17.50	0.00	0.00	0.00	0.00	0.00	0.00	0.00
1994	Ambuja Cement	0.00	4.94	0.00	0.00	0.00	4.94	0.00	0.00
1992/93	Arvind Mills	0.00	3.33	0.00	0.00	0.00	3.33	0.00	0.00
1997	Asian Electronic	0.00	5.06	0.00	0.00	0.00	5.06	0.00	0.00
2003	BHF	10.90	0.00	10.90	0.00	0.00	0.00	0.00	0.00
2001/04	BILT	0.00	0.00	15.00	0.00	0.00	0.00	15.00	0.00
2001	BTVL	0.00	10.00	0.00	0.00	0.00	10.00	0.00	0.00
2003	Balrampur	15.89	0.00	0.00	0.00	15.89	0.00	0.00	0.00
2001	Basix Ltd.	0.00	0.98	0.00	0.00	0.00	0.98	0.00	0.00
1984/91	Bihar Sponge	0.00	0.05	0.00	0.00	0.00	0.05	0.00	0.00
2001/03	CCIL	2.69	0.00	0.00	0.00	1.78	0.00	0.00	0.00
1997	CEAT	13.05	0.00	0.00	0.00	13.05	0.00	0.00	0.00
1990/92	CESC	18.00	0.00	0.00	40.13	18.00	0.00	0.00	40.13
2002	COSMO	8.75	0.00	0.00	0.00	8.75	0.00	0.00	0.00
2004	Cairn Energy	40.00	0.00	0.00	0.00	1.00	0.00	0.00	0.00
1995	Centurion Bank	0.00	0.77	0.00	0.00	0.00	0.77	0.00	0.00
2003	DQEL	0.00	1.50	0.50	0.00	0.00	1.50	0.50	0.00
2003	Dewan	12.86	0.00	0.00	0.00	12.86	0.00	0.00	0.00
1997	EEPL	0.00	0.03	0.00	0.00	0.00	0.03	0.00	0.00
	EXB-STG	0.31	0.00	0.00	0.00	0.31	0.00	0.00	0.00
1995	GE Capital	0.00	4.39	0.00	0.00	0.00	4.39	0.00	0.00
2001	GTF Fact	0.00	2.39	0.00	0.00	0.00	2.39	0.00	0.00
1994	GVK	0.00	7.45	0.00	0.00	0.00	7.45	0.00	0.00
1994/98/00	Global Trust	0.00	0.36	0.00	0.00	0.00	0.36	0.00	0.00
1994	Gujarat Ambuja	0.00	4.88	0.00	0.00	0.00	4.88	0.00	0.00
2003	HDFC	100.00	0.00	0.00	100.00	100.00	0.00	0.00	100.00
1998	IAAF	0.00	1.97	0.00	0.00	0.00	1.81	0.00	0.00
1995/00	ICICI-SPIC Fine	0.00	2.79	0.00	0.00	0.00	2.79	0.00	0.00
1998	IDFC	0.00	15.46	0.00	0.00	0.00	15.46	0.00	0.00
2001	IIEL	0.00	3.19	0.00	0.00	0.00	2.06	0.00	0.00
1990/93/98	IL & FS	0.00	3.12	0.00	0.00	0.00	3.12	0.00	0.00
1992/95	IL&FS VC	0.00	0.60	0.00	0.00	0.00	0.60	0.00	0.00
2000	IndAsia Fund	0.00	15.00	0.00	0.00	0.00	0.61	0.00	0.00
1996	India Direct Fnd	0.00	6.86	0.00	0.00	0.00	6.35	0.00	0.00
1985/90/94	India Lease	0.00	0.30	0.00	0.00	0.00	0.30	0.00	0.00
2001	Indian Seamless	10.50	0.00	0.00	0.00	6.00	0.00	0.00	0.00
1993	Indo Rama	10.48	0.00	0.00	0.00	10.48	0.00	0.00	0.00
	Indo Rama (IRTL)	0.00	0.71	0.00	0.00	0.00	0.71	0.00	0.00

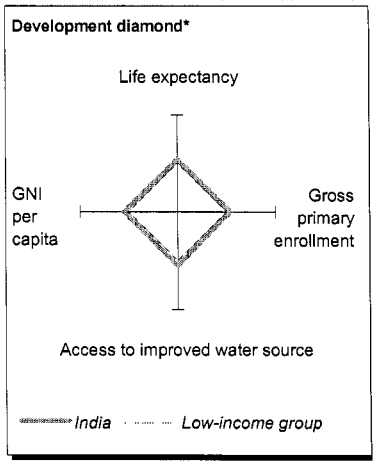
1996	Indus II	0.00	1.97	0.00	0.00	0.00	1.97	0.00	0.00
1992	Indus VC Mgt Co	0.00	0.01	0.00	0.00	0.00	0.01	0.00	0.00
1992	Indus VCF	0.00	0.59	0.00	0.00	0.00	0.59	0.00	0.00
1992	Info Tech Fund	0.00	0.62	0.00	0.00	0.00	0.62	0.00	0.00
1992/94	Ispat Industries	7.50	0.00	0.00	0.00	7.50	0.00	0.00	0.00
2001	Jetair	0.00	0.00	15.00	0.00	0.00	0.00	15.00	0.00
2003	L&T	50.00	0.00	0.00	0.00	50.00	0.00	0.00	0.00
1990/93	M&M	0.00	0.03	0.00	0.00	0.00	0.03	0.00	0.00
2001	MIECL	0.00	1.65	0.00	0.00	0.00	1.15	0.00	0.00
2002	MMFSL	11.13	0.00	7.95	0.00	11.13	0.00	7.95	0.00
2003	MSSL	0.00	2.29	0.00	0.00	0.00	2.20	0.00	0.00
2001	MahInfra	0.00	10.00	0.00	0.00	0.00	0.57	0.00	0.00
2003	Max Healthcare	20.44	0.00	0.00	0.00	0.00	0.00	0.00	0.00
1996/99/00	Moser Baer	27.29	9.68	0.00	0.00	27.29	9.68	0.00	0.00
1992/96/97	NICCO-UCO	1.88	0.13	0.00	0.00	1.88	0.13	0.00	0.00
2001	NIIT-SLP	4.20	0.00	0.00	0.00	0.05	0.00	0.00	0.00
2003	NewPath	0.00	10.00	0.00	0.00	0.00	6.00	0.00	0.00
2003	Niko Resources	30.00	0.00	0.00	0.00	20.00	0.00	0.00	0.00
2001	Orchid	0.00	4.67	0.00	0.00	0.00	4.67	0.00	0.00
1997	Owens Corning	12.44	0.00	0.00	0.00	12.44	0.00	0.00	0.00
2004	Powerlinks	77.20	0.00	0.00	0.00	0.00	0.00	0.00	0.00
1995	Prism Cement	11.25	5.02	0.00	6.00	11.25	5.02	0.00	6.00
2001	RCIHL	0.00	1.97	0.00	0.00	0.00	1.97	0.00	0.00
2001	RTL	0.00	0.45	0.00	0.00	0.00	0.45	0.00	0.00
1995	Rain Calcining	0.00	3.84	0.00	0.00	0.00	3.84	0.00	0.00
1997	SAPL	0.00	0.07	0.00	0.00	0.00	0.07	0.00	0.00
2001	SBI	50.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
1997/00	SREI	9.00	0.00	0.00	0.00	9.00	0.00	0.00	0.00
1995	Sara Fund	0.00	5.94	0.00	0.00	0.00	5.94	0.00	0.00
2001/03	Spryance	0.00	1.00	0.00	0.00	0.00	1.00	0.00	0.00
2004	Sundaram Finance	45.41	0.00	0.00	0.00	45.41	0.00	0.00	0.00
2000/02	Sundaram Home	11.35	0.00	0.00	0.00	11.35	0.00	0.00	0.00
1998	TCW/ICICI	0.00	3.92	0.00	0.00	0.00	3.92	0.00	0.00
2002	TELCO	50.00	0.00	0.00	0.00	50.00	0.00	0.00	0.00
1989	Tata Electric	16.05	0.00	0.00	0.00	16.05	0.00	0.00	0.00
1989	UCAL	0.00	0.03	0.00	0.00	0.00	0.03	0.00	0.00
2004	UPL	17.50	0.00	0.00	0.00	17.50	0.00	0.00	0.00
1996	United Riceland	8.75	0.00	0.00	0.00	8.75	0.00	0.00	0.00
2002	Usha Martin	21.00	3.60	0.00	0.00	21.00	3.60	0.00	0.00
2001	Vysya Bank	0.00	3.66	0.00	0.00	0.00	3.66	0.00	0.00
1997	WIV	0.00	1.97	0.00	0.00	0.00	1.97	0.00	0.00
1988	WTI	0.00	0.20	0.00	0.00	0.00	0.20	0.00	0.00
1997	Walden-Mgt India	0.00	0.02	0.00	0.00	0.00	0.02	0.00	0.00
2002	Webdunia	0.00	2.00	0.00	0.00	0.00	0.67	0.00	0.00
	Total portfolio:	746.30	171.46	49.35	146.13	511.16	139.92	38.45	146.13

		Approvals Pending Commitment			
FY Approval	Company	Loan	Equity	Quasi	Partic.
2000	APCL	0.01	0.00	0.00	0.00
2004	CGL	0.03	0.00	0.00	0.00
2004	CIFCO	0.00	0.00	0.02	0.00
2003	DQEL	0.00	0.00	0.00	0.00
2001	GI Wind Farms	0.01	0.00	0.00	0.00
2003	Niko Resources	0.01	0.00	0.00	0.00
2004	Ocean Sparkle	0.00	0.00	0.00	0.00
2004	Sealion Sparkle	0.01	0.00	0.00	0.00
2002	TML	0.02	0.00	0.00	0.00
2001	Vysya Bank	0.00	0.00	0.00	0.00
	Total pending commitment:	0.09	0.00	0.02	0.00

Annex 14: Country at a Glance

INDIA: HYDROLOGY PROJECT PHASE II

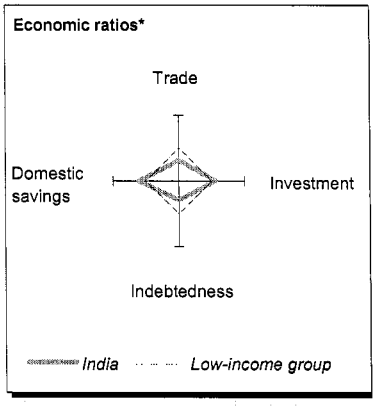
POVERTY and SOCIAL	India	South Asia	Low-income
2002			
Population, mid-year *(millions)*	1,048.3	1,401	2,495
GNI per capita *(Atlas method, US$)*	470	460	430
GNI *(Atlas method, US$ billions)*	494.8	640	1,072
Average annual growth, 1996-02			
Population *(%)*	1.7	1.8	1.9
Labor force *(%)*	2.2	2.3	2.3
Most recent estimate (latest year available, 1996-02)			
Poverty *(% of population below national poverty line)*	29	..	..
Urban population *(% of total population)*	28	28	30
Life expectancy at birth *(years)*	63	63	59
Infant mortality *(per 1,000 live births)*	67	71	81
Child malnutrition *(% of children under 5)*	..	..	..
Access to an improved water source *(% of population)*	84	84	76
Illiteracy *(% of population age 15+)*	41	44	37
Gross primary enrollment *(% of school-age population)*	102	97	95
Male	111	108	103
Female	92	89	87



KEY ECONOMIC RATIOS and LONG-TERM TRENDS

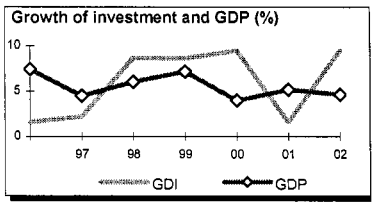
	1982	1992	2001	2002
GDP *(US$ billions)*	194.8	244.2	478.5	510.2
Gross domestic investment/GDP	21.7	23.8	22.3	22.8
Exports of goods and services/GDP	6.1	9.0	13.5	15.2
Gross domestic savings/GDP	18.3	21.8	23.5	24.2
Gross national savings/GDP	19.2	21.8	25.5	26.3
Current account balance/GDP	-2.0	-1.6	0.1	0.6
Interest payments/GDP	0.4	1.4	0.8	0.7
Total debt/GDP	14.1	37.0	20.4	20.6
Total debt service/exports	13.6	28.0	11.7	13.9
Present value of debt/GDP	..	..	14.2	..
Present value of debt/exports	..	..	84.7	..

	1982-92	1992-02	2001	2002	2002-06
(average annual growth)					
GDP	5.6	6.0	5.2	4.6	6.2
GDP per capita	3.4	4.2	3.5	3.0	4.7
Exports of goods and services	6.9	13.5	7.1	21.8	7.9

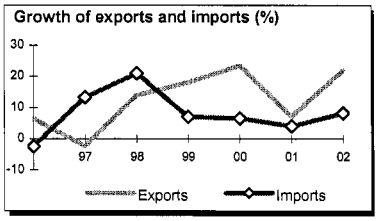


STRUCTURE of the ECONOMY

	1982	1992	2001	2002
(% of GDP)				
Agriculture	35.9	30.9	25.0	22.7
Industry	25.8	26.7	25.7	26.6
Manufacturing	16.2	16.2	15.3	15.6
Services	38.3	42.3	49.4	50.7
Private consumption	69.9	65.8	65.9	65.0
General government consumption	10.7	11.2	12.5	12.5
Imports of goods and services	8.4	9.8	14.1	15.6



	1982-92	1992-02	2001	2002
(average annual growth)				
Agriculture	3.1	2.5	6.5	-5.2
Industry	6.7	6.2	3.4	6.4
Manufacturing	6.5	6.6	3.6	6.2
Services	6.8	8.2	6.8	7.1
Private consumption	5.3	5.0	6.2	-0.8
General government consumption	6.1	7.1	3.0	3.1
Gross domestic investment	5.7	7.2	1.6	9.5
Imports of goods and services	5.7	12.0	4.0	8.1

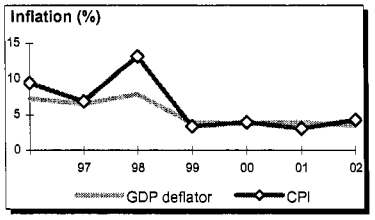


Note: 2002 data are preliminary estimates.

* The diamonds show four key indicators in the country (in bold) compared with its income-group average. If data are missing, the diamond will be incomplete.

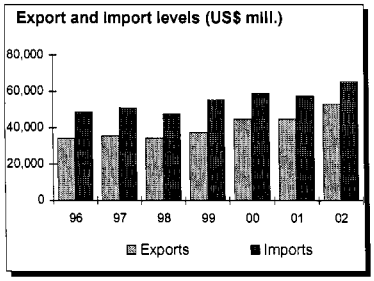
PRICES and GOVERNMENT FINANCE

	1982	1992	2001	2002
Domestic prices				
(% change)				
Consumer prices	6.7	12.6	3.1	4.3
Implicit GDP deflator	7.7	8.8	3.9	3.5
Government finance				
(% of GDP, includes current grants)				
Current revenue	..	18.7	17.5	19.1
Current budget balance	..	-3.2	-8.1	-7.4
Overall surplus/deficit	..	-7.2	-10.5	-10.9



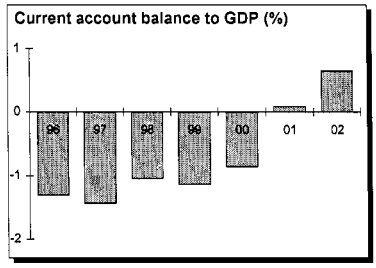
TRADE

	1982	1992	2001	2002
(US$ millions)				
Total exports (fob)	9,490	18,869	44,915	53,000
Marine products	377	602	1,237	1,381
Ores and minerals	445	738	1,262	1,900
Manufactures	5,109	14,039	33,370	38,353
Total imports (cif)	16,468	24,316	57,618	65,474
Food	1,071	507	2,043	2,368
Fuel and energy	5,957	6,100	14,000	17,640
Capital goods	2,662	4,532	9,882	12,746
Export price index *(1995=100)*	94	95	90	101
Import price index *(1995=100)*	125	96	93	100
Terms of trade *(1995=100)*	75	99	97	101



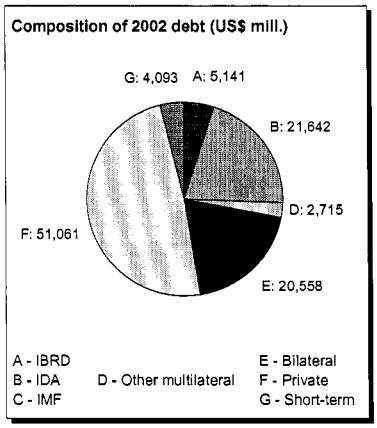
BALANCE of PAYMENTS

	1982	1992	2001	2002
(US$ millions)				
Exports of goods and services	12,377	23,599	65,580	77,986
Imports of goods and services	18,352	27,917	73,706	84,254
Resource balance	-5,975	-4,318	-8,126	-6,268
Net income	-335	-3,423	-3,601	-4,882
Net current transfers	2,510	3,852	12,125	14,448
Current account balance	-3,800	-3,889	398	3,298
Financing items (net)	3,101	4,692	11,359	13,682
Changes in net reserves	699	-803	-11,757	-16,980
Memo:				
Reserves including gold *(US$ millions)*	4,896	9,832	54,106	75,428
Conversion rate *(DEC, local/US$)*	9.7	30.6	47.7	48.4



EXTERNAL DEBT and RESOURCE FLOWS

	1982	1992	2001	2002
(US$ millions)				
Total debt outstanding and disbursed	27,546	90,264	97,516	105,210
IBRD	1,395	9,326	7,015	5,141
IDA	6,983	15,438	20,402	21,642
Total debt service	2,054	7,697	9,327	13,042
IBRD	172	1,395	1,372	3,029
IDA	72	267	569	637
Composition of net resource flows				
Official grants	394	363	384	410
Official creditors	1,352	2,543	365	-3,657
Private creditors	1,180	1,563	-1,569	-1,861
Foreign direct investment	0	313	4,741	3,611
Portfolio equity	0	244	1,951	944
World Bank program				
Commitments	1,889	2,678	2,190	1,523
Disbursements	1,397	1,954	2,089	1,465
Principal repayments	98	834	1,467	3,196
Net flows	1,300	1,119	622	-1,730
Interest payments	146	828	474	470
Net transfers	1,153	292	148	-2,200



MAP SECTION