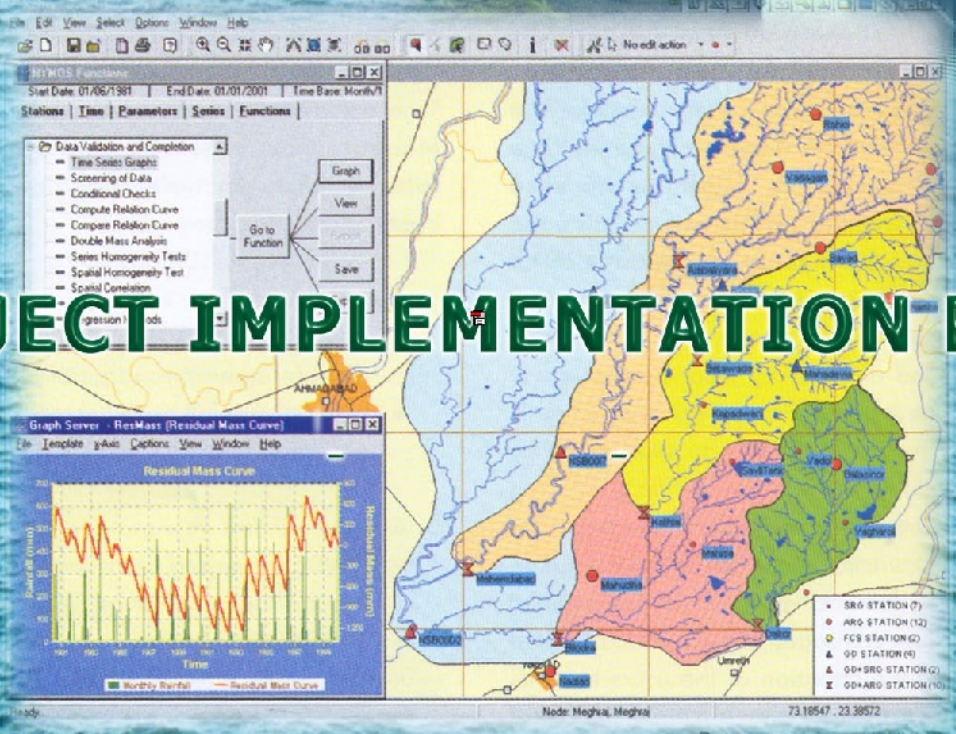
HYDROLOGY PROJECT PHASE - II

(HP-II)



PROJECT IMPLEMENTATION PLAN

GOVERNMENT OF INDIA
Ministry of Water Resources

May 2004

C.S. RENJIT, PIP Consultant

Chapter 1

Introduction

Realizing the need for a sound hydrological database in the context of a paradigm shift towards comprehensive planning and development and management of water resources in a river basin basis, Government of India has been making efforts to develop databases covering all aspects of hydrological cycle. Government of India set up scientifically verified, uniformly acceptable and widely acceptable hydrological records and databases during first Hydrology Project (HP-I). The current project is a follow on to HP-I.

1.1 Current Status of Water Resources Development in India

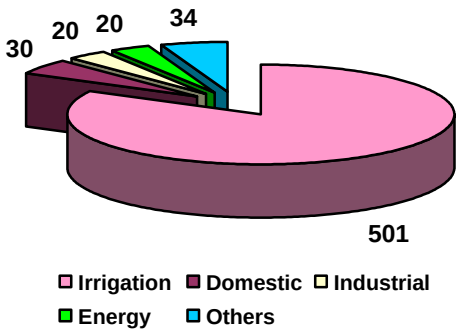
India, the 7th largest country in the World has a total area of 3,287,590 km^2, which is roughly 2.45% of World's land resources. The total population of the country is 1,027.01 Million (2001), which is almost 16% of the World population, which rank the country as the second most populous country in the World.

India has got 4% of the World's water resources which "comes from":

- Average annual precipitation, by way of rain and snow - 4,000 km^3.
- The average rainfall is 1,170 mm, which varies significantly in temporal and spatial distribution across the country.
- The total annual water yield from snowmelt of glaciers in India may be of the order of 200 km^3.
- The annual natural run off of 20 river units in the country consisting of 14 major river basins and 19 other river basins grouped into 6 river units, is 1,869 km^3.
- The utilizable surface water is 690 km^3.
- The replenishable ground water resources are 432 km^3 per year.
- The annual utilizable water resources of the country are 1,122 km^3.

The current utilization of India's water resources is 605 km^3 of which 63% is drawn from surface water and 37% from ground water resources. The present pattern of utilization of water is given in *Figure 1.1*.

Figure 1.1 The Current Water Utilization (Figures in km^3)



1.2 Main Considerations in Water Resources Management

Depletion of available fresh water resources, falling ground water levels and deteriorating water quality are all posing a variety of challenges in managing India's water resources. Competing demands from the diversified needs of a growing population are quite often leading towards disputes among users including State Governments.

Reckoning by the definition of Dr. Malin Falkenmark of the Swedish International Water Institute, the per capita water availability in India is raising concerns. The annual per capita availability of renewable fresh water in the country has fallen from around 5,277m^3 in 1955 to 2,564m^3 in 1990. Given in projected increase in population by the year 2025, the per capita availability is likely to drop below 1,000m^3 a situation labelled as "water scarcity"[1]. The key challenges to better management of the water resources in India are:

- **Temporal and spatial variation of rainfall**: India receives 70% to 90% of its annual rainfall from southwest monsoons in less than 120 days from June to September. The average rainfall varies significantly from place to place. While Rajasthan receives less than 150 mm per year, Chirrapunji receives 11,000mm.

- **Uneven geographic distribution of surface water resources**: About 40% of utilizable surface water resources and 60% of the total water resources of India are to be found in Ganga, Brahmaputhra and Meghna river systems, which account for 33% of the geographical area of the country. 11% of the total water resources are found in west flowing rivers south of Tapi covering just 3% of the area. Only 29% of the total water resources are spread in the remaining river systems covering 64% of the land area.

- **Persistent Droughts**: Apart from the desert areas of Rajasthan, there are drought prone areas covering large parts of Gujarat, Maharashtra, Karnataka, Andhra Pradesh and Tamil Nadu States. A total of 74 Districts spread over 13 States of the country have been identified as drought prone with an area of 51.1 Million hectares (roughly 16% of the total geographic area).

- **Recurrent Floods**: The total flood prone area in India is to the tune of 40 Million hectares out of which 14 Million hectares have been reasonably protected against floods. In addition to structural measures, other measures like flood forecasting and warning, flood proofing etc. are being adopted to mitigate the miseries due to floods.

- **Overuse of ground water and contamination**: Ground water accounts for over 80% of rural domestic water supply and 40% of the irrigation water supply in India. Unsustainable levels of ground water extraction lead to the overall depletion in water resources especially when withdrawal rates exceed the replenishment rate of the aquifer. Over 10% of the blocks in the country have been classified as overexploited and the number of blocks added to the list is increasing each year.

- **Drainage and salinization**: An estimated 23 Million hectares land are wet deserts affected by water logging and salinity.

[1] The Annual Water Resources per capita (AWR) of 1,700m^3 means occasional and local stress, an AWR of less than 1,000m^3 indicates condition of stress and an AWR of 500m^3 or less means threat to life.

- **Water Quality Problems**: Water pollution is a serious concern in India, with growing numbers of surface water resources and ground water resources contaminated with biological and chemical pollutants. Increased use of agro chemicals in the past five decades has contributed significantly to the pollution of water resources. Increasing industrial development with inadequate zoning and emission regulations contribute to water pollution. Domestic generation of wastewater and untreated discharge of sewage into the water bodies make the river systems heavily polluted. Inadequate treatment of human and animal waste and improper disposal of solid waste are leading to surface and ground water pollution.

  Irreversible contamination of ground water is threatening the health of human being and also the environment. There are some aquifers contaminated with naturally occurring minerals such as arsenic, iron, sulphur and fluoride. Arsenic contamination in parts of West Bengal and high levels of fluoride are affecting human health.

  In coastal areas salt water intrusion is contaminating both surface water and local aquifers.

1.3 National Water Policy

India has adopted a National Water Policy establishing the policy, legal and institutional arrangement for comprehensive and integrated planning, development and management of the water resources in the country. Recognizing water as a prime natural resource and a basic human need, water is considered as a "precious national asset"[2].

The Policy clearly identifies the need for institutionalised arrangements to maintain a robust and transparent hydrological database including appropriate training as a prime requisite for surface and ground water resource planning in basins and sub-basins. The relevant provisions of the policy document relating to Hydrological Information System[3] are:

- "A well developed information system, for water related data in its entirety, at the national / state level, is a prime requisite for resource planning. A standardized national information system should be established with a network of data banks and databases, 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."

[2] India, National Policy on Water 2002, Article 1.1
[3] India, National Policy on Water 2002, Article 2.1 to 2.3

1.4 Hydrology Project, Phase – I

Government of India implemented the Hydrology Project, Phase – I with the following objectives:

- Improve organizational arrangements for hydrological, hydro-meteorological and water quality data measurement, validation, analysis and storage
- Strengthen institutional and technical capabilities
- Improve physical facilities and services for hydrological, hydro-meteorological and water quality data measurement, validation and analysis
- Improve the use of hydrological, hydro-meteorological and water quality data

The project was implemented in 9 States and 6 Central Agencies[4]. The project was launched in December 1995 and closed on 31st December 2003. The project was implemented with an IDA credit of US$ 122 Million and Technical Assistance grant from Royal Government of Netherlands of Euro 14.85 Million. The total cost of the project excluding the technical assistance grant is US$ 135 Million (INR 6,035 Million).

Major Achievements of Hydrology Project, Phase – I

- The project established a National Hydrological Measurement Network with standardized hydrological data collection and processing and the design and implementation of valid, comprehensive, interactive, easily accessed and user-friendly databases covering all-important aspects of the hydrological cycle. The project developed common procedures, protocols and specifications for data collection, analysis and storage, and the introduction of a mechanism for inter-agency data validation.
- The project established institutional structures for co-ordinating project implementation at the National and State levels. At the National level the National Steering Committee, the National Co-ordination Committee, the National Hydrology Training Committee and R&D Evaluation Committees were established. The project Co-ordination Secretariat headed by the Commissioner, WM was the nodal point for project implementation. At the State level, the State Level Steering Co-ordination Committee was the apex body for implementing the project. The establishment of the institutional arrangement for project implementation has significantly facilitated the decision-making process.
- The project installed 916 new river gauging sites
- The project established 436 hydro-meteorological stations
- Under the project 7,889 observation wells have been established
- Under the project 258 water quality labs have been established
- The project established surface water and ground water equipments like AWLRs and DWLRs
- Under the project 620 computers have been set up to process hydrological data
- 390 data centres and 28 data storage centres have been set up for establishing HIS
- The dedicated hydrological data entry and processing software (SWDES and GWDES) and data processing software (HYMOS, GEMS and WISDOM) have been made fully operational

[4] The States are Andhra Pradesh, Gujarat, Karnataka, Kerala, Madhya Pradesh, Chattisgarh, Maharashtra, Orissa and Tamil Nadu and the Central Agencies are: Ministry of Water Resources, Central Water Commission, Central Ground Water Board, Central Power and Water Research Station, National Institute of Hydrology and India Meteorological Department.

- Websites have been launched in many states to disseminate HIS. Yearbooks, monthly reports, newsletters, public awareness campaigns etc. are also being used to disseminate the data.
- The project has provided extensive skill building of staff in HIS and related areas. Over 9,000 people have been trained.
- The HIS reference manual for surface water domain covering various operational, maintenance and management operations of HIS has been completed. The manual for ground water domain is getting ready.
- Hydrological Data User Groups have been formed in all the states and central level with representatives of Governmental and Non Governmental Organizations.
- The project has initiated some of the very innovative research and development project using HIS
- The data generated under the project has been successfully used in the following fields:
  - Monitoring droughts and floods
  - Optimum design of water conservation/control and high way structures
  - Ground water resource assessment and auditing
  - Planning on inter-state rivers
  - Water quality monitoring
  - Supporting the synthesis of State Water Policies and framing of Acts and Regulations relating to water resources

1.5 Key Learning from National Hydrology Project, Phase - I

- The functioning of the Project Co-ordination Secretariat has been effective in co-ordinating the project implementing agencies. However, this need to be further strengthened by nominating senior personnel from CWC, CGWB and IMD. The functioning of the Project Co-ordination Secretariat to be strengthened for carrying out the financial management, procurement functions and project management/ co-ordination functions effectively.
- The performance of the consultants under the technical assistance provided by Royal Government of Netherlands, has proved to be very useful. A suitable withdrawal strategy aimed at institutionalising technical and managerial capacity within the IAs would have substantially increased the sustainability of the achievements.
- The financial management function and procurement skills needed additional strengthening
- The involvement of Hydrological Data User Groups in the use and application of HIS can be improved
- The co-ordination among the Central Agency and implementing States is crucial to achieving a comprehensive HIS. There shall be better information flows and sharing of data.
- Rigorous quality assurance on data collection, processing, analysis and reporting including validation and authentication need to be implemented
- Substantial skill building in software maintenance and updation is required
- The software developed especially for the ground water domain included wide ranging functionality resulting in elaborate and hardware demanding capacities. It will be worthwhile to promote use of customised in country software that respond to the needs and requirements of users.

Chapter 2

Project Design

Government of India implemented the Hydrology Project, HP-I (1995-2003) with the assistance from IDA and technical assistance under Bilateral Indo-Dutch Agreement. The HP-I established an integrated Hydrological Information System (HIS), providing reliable, comprehensive and timely hydrological and meteorological data. It consists of scientific, hydrological and meteorological observation networks for both surface and ground water data covering quantitative as well as qualitative aspects; data processing and storage facilities; reliable data communications arrangements; and trained man power for HIS operation and user support. India's hydrological database still needs improvement in terms of geographic coverage and modern analytical tools, decision support tools, design aids and methodologies for improved hydrologic planning, designing of water resources development and long term water resources management etc. There is also a felt need to improve the skills of manpower for hydrological modelling and data analysis.

The proposed Hydrology Project Phase – II, as a sequel to HP-I will build on and expand development of a comprehensive HIS, improving access and use by user departments, civil society and other data users in the sector, thereby intensifying the use of HIS in effective and efficient water resources planning and management.

2.1 Project Objectives

The project development objective 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 8 Central Agencies. The coverage of existing states under the project is to help them moving over from development HIS (as in HP-I) towards use of HIS in water resources planning and management.

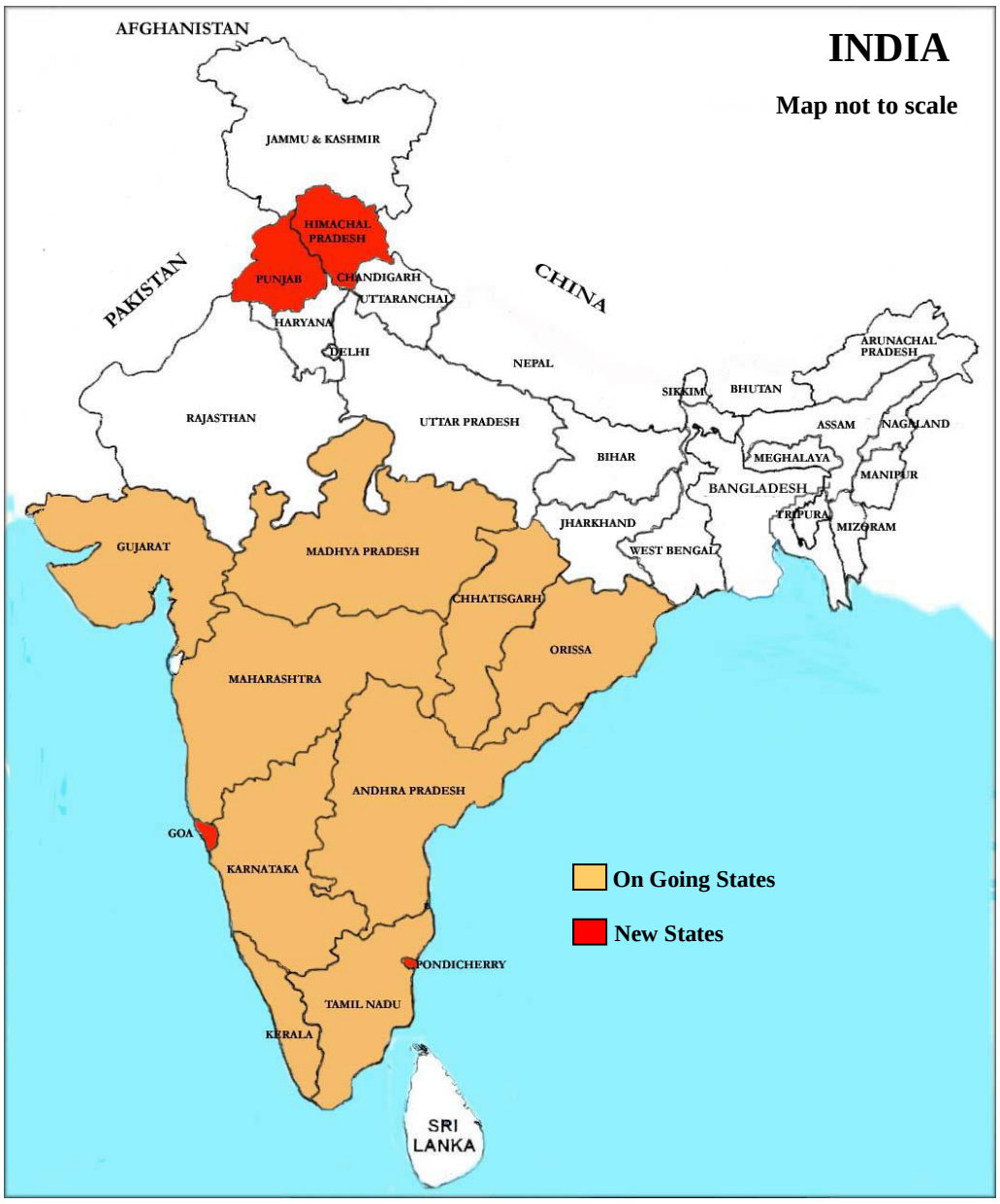
The project development objective will be achieved by:

(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.

2.2 Project Scope

The creation of HIS together with the associated improved facilities and agreed organization procedures for collection, collation processing and exchange of hydrological and hydro meteorological data will be extended to 13 States and 8 Central Agencies. In addition to the states included in HP-I – Andhra Pradesh, Gujarat, Maharashtra, Karnataka, Kerala, Madhya Pradesh, Chattisgarh, Orissa and Tamil Nadu, 4 additional states – Himachal Pradesh, Goa, Pondicherry and Panjab will be covered under the project. The central agencies covered under the project 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). The project states are shown in *Figure 2.1*.

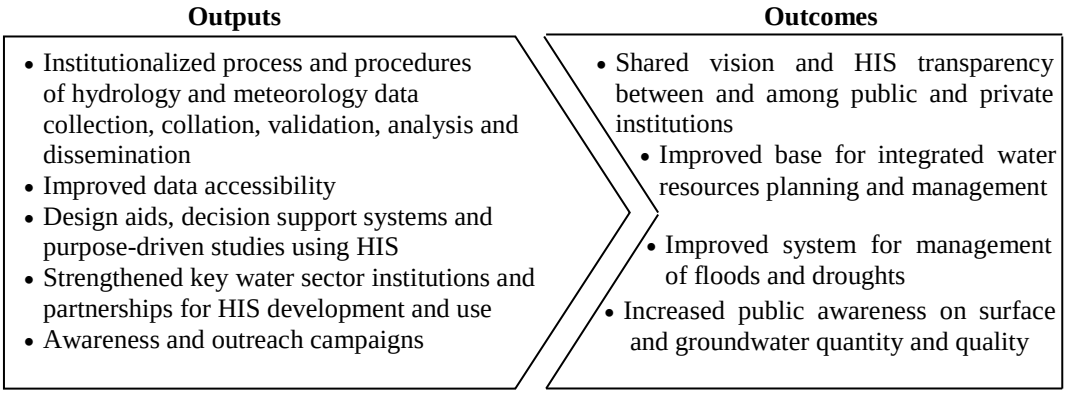
Figure 2.1 Project States



2.3 Expected Outcome and Key Performance Indicators

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 sustainable access to water for drinking, irrigation and other livelihood uses. The expected outputs and resultant outcome from the project are listed in *Figure 2.2* below:

Figure 2.2 Conceptual Framework of Project Outputs and Outcomes



Specific measurable indicators for the outcomes and outputs will be developed by the management consultants to be deployed under the project. They will develop these in consultation with HISCS and the Implementing Agencies (IA) during the design of the project monitoring system.

2.4 Project Components

The project would consist of three main components:

I. **Institutional strengthening**, covering all 13 States and 8 Central Agencies;
II. **Vertical Extension**, covering the 9 existing States and 6 Central Agencies; and
III. **Horizontal Expansion**, covering the 4 new States and 2 Central Agencies (CPCB and BBMB)

2.5 Project Component Description

2.5.1 Component – I: Institutional Strengthening (INR 1938.87 Million)

This component to be implemented by all the IAs and comprise 3 sub-components namely:

A. Consolidation of HP-I activities in the existing states;
B. Awareness raising, dissemination and knowledge sharing; and
C. Implementation support

1. A. Consolidation of HP-I activities in the existing states (INR 298.47 Million)

The existing IAs will be supported for physical and financial sustainability of operation and management of the hydrological network and instrumentation established under HP-I. The main activities proposed under the sub-component fall under:

- Strengthening capacities to use existing hardware and software:
  - Supplementary training in HIS data processing and software relating to basic and advanced hydrology, statistical applications etc.
  - Training on the water quality procedures and use of specialized water quality equipments, GIS software and applications etc.
  - Quality assurance for strengthening compliance with protocols and standards including water quality.
- Upgrading IT infrastructure:
  - Upgrading data processing by providing hardware, software and networking capacities
  - Strengthening spatial analysis and dissemination of standard and user specified maps by providing GIS software and applications, image processing software, procurement of spatial data sets and building capacities.
- Upgrading hydrometric equipment and network capacity
- Creation of a centre of excellence for equipment maintenance in CWPRS.

1.B Awareness raising, dissemination and knowledge sharing (INR 409.29Million)

The project will finance a management consultancy service to assist the Hydrological Information System Co-ordinating Secretariat (previously the Project Co-ordinating Secretariat of HP-I) to implement the following activities:

- Developing an appropriate strategy based on established principles for spreading awareness, dissemination and knowledge sharing among IAs and HIS users including collaboration with universities to train personnel of IAs.
- Preparing and implementing an action plan for awareness raising and data dissemination.
  - Creation of resource material for different media meant for awareness raising and training
  - Publications - periodic as well as specific
  - Development and maintenance of websites for IAs
  - Conducting workshops, seminars, exhibitions, awareness raising through mass media, training of data users and elected representatives, support to Hydrologic Data User Groups (HDUG)
- Implementing knowledge/experience sharing and inter-agency collaboration
  - Conducting local or national workshops and study tours including those meant for Decision Support System (DSS) and design aids
  - Conducting international trainings/study tours including those for DSS.

I. C. Implementation support (INR 1231.12 Million)

This sub-component will assist the HISCS as well as state level IAs the necessary implementation support services:

- Providing management consultancy for better management and monitoring of project implementation by HISCS and IAs for developing and implementing Monitoring and Learning systems, financial management, procurement, MIS, organizational development etc. The ToR for the Management Consultancy is given in **Attachment 2.1.**
  - Workshops for organizational development, soft skills to strengthen an intra-agency collaboration, trainings on procurement, financial management, MIS, awareness raising etc.
- Providing consultancy services for technical assistance towards implementation support as detailed in ToR given in **Attachment 2.2.**
- Logistical support including office equipments, vehicles etc.
- Incremental recurrent costs for project management including incremental staff costs and incremental operation and maintenance costs
- National as well as overseas training and study tours for the personnel of the IAs

2.5.2 Component –II: Vertical Extension (INR 2,294.72 Million)

This component include activities, which would enhance the use of HIS in the 9 HP-I States and 6 Central Agencies. The component is expected to demonstrate real hydrological data applications for future replication through the selective upgradation of spatial data inputs and outputs and data visualization. Depending upon the capacity of the participating operational agencies, the nature (planning and real time DSS) and scope of the proposed activities, selective upgrading of the existing HIS will be undertaken through the following:

- 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

The following are the sub-components:

A. Development of hydrological design aids;
B. Development of DSS; and
C. Implementation of purpose driven studies.

II.A. Development of Hydrological Design Aids (INR 173.68 Million)

The hydrological design in water resources project in India have been carried out by most of the agencies using empirical/rational methods with very little application of available data.

Hydrology Project-I has enabled the creation of the computerized HIS in nine States. HIS comprises SW data (daily/monthly annual rainfalls, river flows, and WQ) and GW data (water levels, WQ and pumping test data). The length of record varies from a few years to

over 100 years in some States (the latter includes historic records). For the first time in India processed and validated hydrologic records are available to users in an easily accessible, user-friendly form. These data are already being used in project planning and design by Central and State Agencies. But the orderly dissemination of the computerized data is a challenge to all the users. The most important step in data dissemination would be the creation/ development of standardized hydrological design aids using well-established, internationally acceptable methodologies. These design aids would not only facilitate and expedite hydrological design and SW/GW resources assessment but would also, for the first time, usher in a uniformity of approach among States and also between States and Central Agencies.

This sub-component will implement the following activities:

- Developing and putting to use hydrological design aids in surface water, ground water and water quality with greater focus on surface water
- Developing uniform procedures and guidelines for accessing the gauged and un-gauged catchments
- The project will provide technical assistance by way of international and national consultancies, workshops, on-the-job training, knowledge sharing and transfer of technology. There will be separate consultancies for surface water, ground water and water quality
- The project will also support procurement of internationally available software for design aids and other hydrological analysis

The subcomponent will 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.

The detailed ToR for the development of Hydrological Design Aids for Surface Water Agencies, Ground Water Agencies and Water Quality Issues are given in **Attachment 2.3**, **Attachment 2.4** and **Attachment 2.5**.

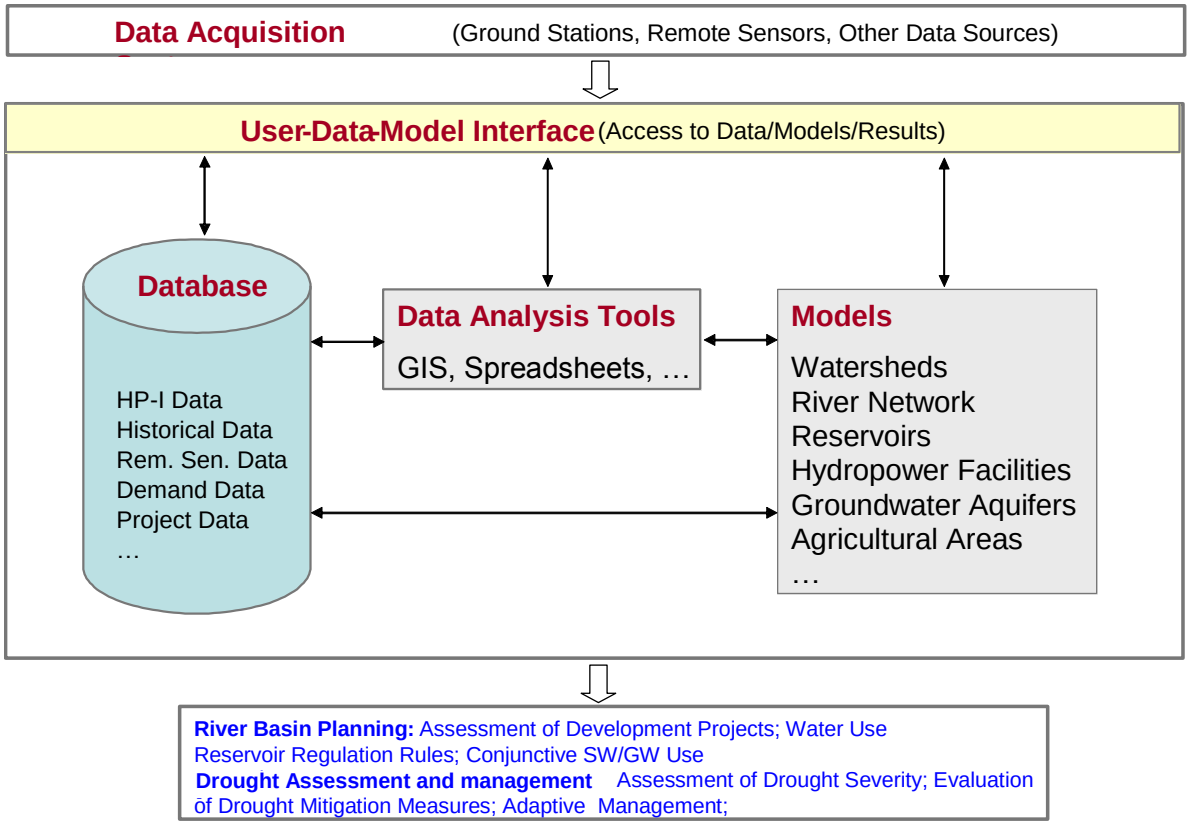
II.B. Development of DSS (INR 1624.72 Million)

In order to promote meaningful use of the data generated under HIS, to support decision making in water resources planning and operational policies, this project will develop DSS consisting of information systems linked to appropriate models. The DSS to be developed under the project will fall into 2 types:

i. DSS for water resources planning; and
ii. DSS for real time forecasting and management including special purpose investigations like, water quality assessment.

The concept, typical elements and structure of DSS are indicated schematically in *Figure 2.3.*

Figure 2.3 Decision Support System Concept– Hydrology Project – II



i. DSS for water resources planning:

Planning DSS pertains to SW and GW planning, reservoir operation, irrigation management, drought management, and conjunctive use of SW and GW. 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 2.1* below:

Table 2.1 Summary of Proposed DSS Planning under HP-II

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)

State	Scope of DSS	Location
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

ii. DSS for real time forecasting and management

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 Bhakra-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 to be taken up through USAID assistance.

Table 2.2 DSS for Real Time Flood Forecasting and Management under HP-II

Basin	Scope of DSS	Location
Bhakra-Beas Basin	Real Time Operational Management	Bhakra-Beas Management Board

In addition, special-purpose DSSs will be developed to support such agencies as CPCB for special modelling 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.

The project will support the following activities for developing DSS:

- Procurement of software including GIS and image processing software
- Procurement of satellite imageries, GIS thematic layers, existing databases etc. for developing the database
- Consultancy services for development of database
- Procurement of IT hardware and equipments for data collection network
- Construction of data collection network
- Incremental staff costs
- Incremental operation and maintenance costs for IT hardware and software and others

The finalization of the proposals under DSS will be done during Year-1. Construction of additional data collection network under the sub-component will be as minimum as possible. The ToR for the Consultancy on DSS development for Water Planning and Basic Operation is given in **Attachment 2.6** and the Consultancy for DSS development for Real Time Operational Management for BBMB is given **Attachment 2.7**.

II.C. Implementation of purpose driven studies (INR 496.32 Million)

The project will finance proposals submitted by the IAs for purpose driven studies, which qualify the following criteria of selection:

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 proposals for the studies submitted by the IAs will be screened during year –1 for implementation during years 2-6 of project implementation. Some of the proposed studies will be done jointly by a group of states in collaboration with CWPRS/NIH. The results and findings from all-purpose driven studies would be shared and disseminated nationally. The project will support the following activities for undertaking purpose driven studies:

- Consultancy support for model development, application etc.
- Procurement of software and data acquisition
- Civil works
- Equipments to be procured
- Training workshops and courses
- Incremental staff costs and operation and maintenance costs

The distinguishing characteristics of the proposed sub-components in the Vertical Extension are summarised in the following *Table 2.3*:

Table 2.3 Distinguishing characteristics of the proposed sub-component in Vertical Extension

	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 (e.g. civil society protection); • Basins should pilot working in different institutional arrangements (e.g. Basin Board or across central and multiple state agencies)	• 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	National 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)

2.5.3 Component –III: Horizontal Expansion (INR 1022.38 Million)

In the 4 new States, the following sub-components will be implemented under the project:

A. Upgrading of data collection network,
B. Establishing/upgrading of data processing and management systems, and
C. Purpose-driven studies; and
D. Training.

III. A Upgrading of data collection network (INR 498.23 Million)

The project will assist the 4 new States to upgrade their data collection networks. The activities to be financed under the sub-component are:

- New and renovated river gauging stations and appropriate equipments
- New and upgraded ground water and aquifer monitoring systems (including piezometers, automatic and digital water level recorders, exploratory/observation boreholes)
- New and upgraded meteorological stations
- New water quality laboratories
- All civil work and equipments in setting up data collection centres will be supported
- Incremental staff costs and operation and maintenance costs

In order to determine the type of equipments and the appropriate sites for surface water, ground water, meteorological stations and water quality labs, initial joint surveys will be undertaken along with CWC, CGWB, IMD and CPCB respectively. The details of data collection network proposed under the project are given in *Table 2.4*.

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

Table 2.4 Details of data collection network under the Project

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	-	6	12
	Level II labs. - new	2	-	-	2 (WRED)
	Level II+/III lab. – new	1	1	1 (SW & GW)	1
	Level II lab.- upgrade				

III. B Establishing/upgrading of data processing and management systems (INR 419.02 Million)

The project will support all agencies responsible for surface water and ground water in the new States to develop HIS systems similar to those developed during HP-I. The proposed activities under the sub-component are:

- Data centre buildings
- Data management computer packages and hardware for maintaining data banks. The computer hardware will consist of a network based file server for data storage and retrieval connected to at least 8 PCs with provision for connection to further PCs. Ancillary equipments will include monitors, digitisers, scanners and plotters to assist in the production of maps. Standardized software packages will be installed at regional and sub-divisional levels. There will be specialized software for surface water, ground water and water quality data processing and management
- Communication facilities to provide intra and inter-agency communication linkages through telephone NICNET or INTERNET enabling free and transparent exchange of data between agencies
- Incremental recurrent staff costs and operation and maintenance costs for data processing and management

III. C Purpose-driven studies (INR 83.16 Million)

Purpose-driven studies to be undertaken by the 4 new States will be similar to those supported under the Vertical Extension component. The same procedure will be adopted for selecting and implementing proposals. The proposed activities are also similar.

III. D Training (INR 21.98 Million)

The project propose to provide to the staff of the new States formal and on-the-job training using, largely a training-of-trainers approach. NIH, NWA, CWPRS, IMD and specialist consultants will provide appropriate training to both professional and sub-professional staff.

The detailed proposals for implementing the project in the 4 new States are given in **Attachment 2.8**.

2.6 Project Design – Distinguishing Features

The project is designed to help the IAs acquire tools, systems and procedures to manage inter-sectoral water demands more efficiently and equitably with a clear focus of benefits to the most vulnerable strata of the society. The project will also help to plan for and manage extreme hydrologic events like floods and droughts. The project design has got the following distinguishing features:

- **Build on the gains of HP-I**: The project propose to move towards improved planning and design of water resources development utilizing the HIS developed under HP-I. The proposed component of Institutional Strengthening and Vertical Extension are mainly targeted towards the States and Central Agencies, which participated in HP-I.

- **Consistent with National Water Policy (revised 2002)**: The National Water Policy (revised 2002) of Government of India clearly states the need for institutionalised arrangement to maintain a robust and transparent hydrologic database, including appropriate training as a prime requisite for surface and ground water resources planning in basins and sub-basins. It identifies that use of such data would support the strategy of evolving towards water allocation criteria based on reliable hydrological analysis and contribute to consistent and scientifically based decisions.
- **Moving towards IWRM**: The project would not implement IWRM per se. However, it would develop Decision Support Systems (DSS) to move towards IWRM. Linkages would be established in selected states where a major Bank-funded project in the water resource sector is on-going/contemplated.

2.7 Project Costs and Budgets

The total cost of the Project including taxes and duties and physical and price contingencies are estimated at INR **6,318.26** Million or US$ **135.05** million equivalent. *Table 2.5* contains the summary cost estimates. **Attachment 2.9** contains the detailed yearly phasing of component wise analysis of the budget presented Implementing Agencies wise.

Table 2.5 Summary of Component wise Project Cost Estimate

Components	(INR Million)			(US$ Million)			%Foreign Exchange	% Total Base Costs
	Local	Foreign	Total	Local	Foreign	Total		
I. INSTITUTIONAL STRENGTHENING								
1. A. Consolidation of HP-I activities in the existing states	217.32	81.15	298.47	4.83	1.80	6.64	27	6
I.B Awareness raising, dissemination and knowledge sharing	317.07	92.22	409.28	7.05	2.05	9.09	23	8
I.C Implementation support	1,058.60	172.52	1,231.12	23.52	3.83	27.36	14	23
Subtotal INSTITUTIONAL STRENGTHENING	**1,592.99**	**345.89**	**1,938.87**	**35.40**	**7.68**	**43.09**	**18**	**37**
II. VERTICAL EXTENSION								
II.A Development of hydrological design aids	74.00	99.69	173.68	1.64	2.22	3.86	57	3
II.B Development of DSS	1,036.72	587.99	1,624.72	23.04	13.07	36.10	36	31
II.C Implementation of purpose driven studies.	378.30	118.02	496.32	8.41	2.62	11.03	24	9
Subtotal VERTICAL EXTENSION	**1,489.02**	**805.70**	**2,294.72**	**33.09**	**17.91**	**50.99**	**35**	**44**
III. HORIZONTAL EXPANSION								
III.A Upgrading of data collection network	428.04	70.19	498.22	9.51	1.56	11.07	14	9
III.B Upgrading of data processing and management systems	341.33	77.68	419.02	7.59	1.73	9.31	19	8
III.C Purpose-driven studies	65.56	17.60	83.16	1.46	0.39	1.85	21	2
III.D Training	20.89	1.08	21.98	0.46	0.02	0.49	5	-
Subtotal HORIZONTAL EXPANSION	**855.82**	**166.56**	**1,022.38**	**19.02**	**3.70**	**22.72**	**16**	**19**
Total BASELINE COSTS	**3,937.83**	**1,318.15**	**5,255.97**	**87.51**	**29.29**	**116.80**	**25**	**100**
Physical Contingencies	268.18	78.66	346.84	5.96	1.75	7.71	23	7
Price Contingencies	571.84	143.61	715.45	8.56	1.98	10.54	19	9
Total PROJECT COSTS	**4,777.85**	**1,540.42**	**6,318.26**	**102.03**	**33.02**	**135.05**	**24**	**116**

2.8 Project Financing Plan

The overall size of the Project, based on 2004 prices is approximately INR 6,31.83 Crores. This will be funded by Government of India, INR 138.20 Crores (21.9%) and by IBRD, INR 493.62 Crores (78.1%) as summarized in *Table 2.6.*

Table 2.6 Project Financing Plan

	INR Million	US$ Million
IBRD	4,936.24	105.51
Government of India	1,382.02	29.54
Total	**6,318.26**	**135.05**

Source – Project Appraisal Document

The key assumptions in working out the project cost and financing plan are:

- Cost estimates have been developed on the basis of proposals submitted by the IAs and reviewed by HISCS and Appraisal Mission.
- Unit rates for works and equipments are based on CWC and CGWB estimates derived from recently completed procurement activities and experience of HP-I.
- All unit costs for consultancies include travel, per diems, management fees, office renting, consumables and other overheads.
- The total foreign exchange costs is INR 154.04 Crores (US$ 33.02 Million), which is 24.4% of the total costs. The foreign costs mostly consist of international consultancy services, the procurement of specialized equipments (digital water level recorders, equipment for real- time hydrological and meteorological data monitoring as well as real-time data transmission), commercial software, over-sea trainings and study tours, and vehicles.
- 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 81percent of local costs excluding taxes).
- GoI will finance the remaining project costs, which will mostly consist in costs corresponding to taxes and recurrent costs.

The disbursement category wise financing of the total project cost is given in *Table 2.7.*

Table 2.7 Disbursement Category wise Financing Plan

(US$ '000)

Disbursement Category	GoI	IBRD	Total
1. Goods	5,508	35,812	41,320
2. Civil Works	1,988	17,889	19,877
3. Consultancy	2,617	23,551	26,168
4. Training	-	11,287	11,287
5. Incremental Recurrent Costs	19,431	16,966	36,397
Total project costs	**29,544**	**105,506**	**135,049**

Source – Project Appraisal Document

2.9 Implementing Agency wise project costs

The IA wise base cost is presented in *Table 2.8*. The detailed analysis of Implementing Agencies wise base cost tables are presented in **Attachment 2.4, Table-1** showing component wise cost bifurcated into investment costs and recurrent costs.

Table 2.8 Project costs by Implementing Agencies (Base Costs)

Implementing Agencies	Total (INR million)	Share of Project Cost
Andhra Pradesh SW	70.03	1.4%
Andhra Pradesh GW	108.03	2.1%
Chattisgarh SW	84.42	1.6%
Chattisgarh GW	92.18	1.8%
Gujarat SW	94.34	1.8%
Gujarat GW	104.41	2.0%
Karnataka SW	90.94	1.8%
Karnataka GW	144.38	2.8%
Kerala SW	75.54	1.5%
Kerala GW	108.04	2.1%
MP SW	82.09	1.6%
MP GW	120.43	2.3%
Maharastra SW	98.07	1.9%
Maharastra GW	130.29	2.5%
Orissa SW	101.24	2.0%
Orissa GW	112.34	2.2%
TN SW	87.15	1.7%
TN GW	119.40	2.3%
Total Existing States	***1823.37***	***35.1%***
BBMB	242.28	4.4%
CWC	248.98	4.7%
CGWB	279.57	5.3%
CWPRS	36.98	0.7%
CPCB	167.03	3.2%
IMD	316.36	6.1%
NIH	484.51	8.9%
HISCS	433.43	7.8%
Total Central Agencies	***2209.12***	***41.3%***
Goa	187.05	3.6%
Himachal Pradesh	495.04	9.7%
Punjab	409.52	7.9%
Pondicherry	131.87	2.5%
Total New States	***1223.48***	***23.6%***
Total Project Base Cost	**5255.97**	**100.0%**
Physical Contingencies	**346.84**	**7.0%**
Price Contingencies	**715.45**	**9.0%**
Total Project Cost	**6318.26**	**116.0%**

Chapter 3

Institutional Framework for Project Implementation

The Institutional Framework proposed for the project will enhance the effective and efficient use of hydrological data to support eventual IWRM applications. The proposed institutional arrangement aim to achieve the following implementation objectives:

- Ensure a very close linkage, continuous interaction and effective co-ordination among the National Agencies and the States involved in the implementation of the project
- Ensure improved access and partnership among all data users like, state departments, private sector, NGOs and user communities so as to mainstream the use of HIS in solving the day to day and longer term water resources development issues facing the country
- Facilitate the current HIS to be more sustainable, demand driven and user friendly so that a shift in focus from data collection and processing to analysis and data use by planners, designers, developers and water users in the country could be achieved

3.1 Implementing Agencies

The project will be a multi state and multi agency project having the following IAs:

(a) On going states

- Andhra Pradesh,
- Gujarat,
- Maharashtra,
- Karnataka,
- Kerala,
- Madhya Pradesh,
- Chattisgarh,
- Orissa, and
- Tamil Nadu

(b) New States

- Himachal Pradesh,
- Goa,
- Pondicherry and
- Punjab

(c) 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),
- Central Pollution Control Board (CPCB), and
- Bhakra-Beas Management Board (BBMB)

3.2 Overall Institutional Framework

The proposed management structure at the National (Central) and at the State level will facilitate a three tier management function of:

- Strategic and policy level functions;
- Project management and review functions, and
- Operational Functions.

The overall institutional structure for implementing the project at the National and State level is summarized in *Table 3.1*.

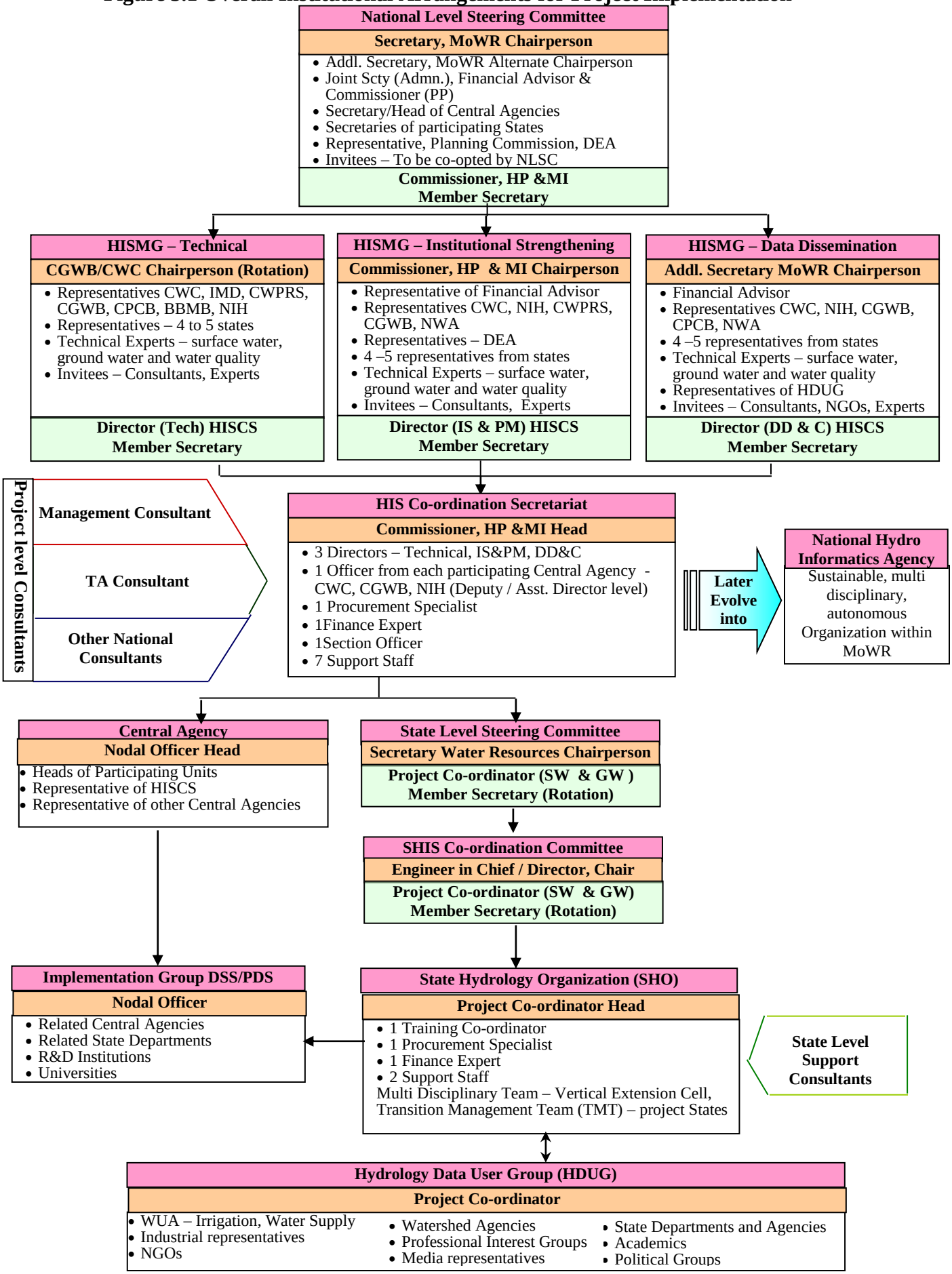
Table 3.1 Overall Institutional Structure

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

*Project to start with existing arrangements, with objective of evolving to a single agency for HIS

The overall organization chart showing the institutional arrangement for implementing the project at the National and State level is given in *Figure 3.1*.

Figure 3.1 Overall Institutional Arrangements for Project Implementation



3.3 National Level Agencies

At the National level, the implementation of the project will be undertaken by the following institutions:

- National Level Steering Committee undertaking strategic and policy functions
- 3 HIS Management Groups – HISMG (DD), HISMG (IS), HISMG (Tech.) undertaking project management and review functions
- HIS Co-ordination Secretariat undertaking operational management functions

3.3.1 National Level Steering Committee (NLSC)

This will be the apex level management body for project.

Constitution

The NLSC will be chaired by Secretary MoWR and the Commissioner HP & MI will be the Member Secretary. The Additional Secretary, MoWR will be the alternate Chairperson. The other members are:

i. MoWR:
   - Joint Secretary (Administration)
   - Financial Advisor
   - Commissioner (PP)

ii. Central Agencies (WR):
   - CWC –Member (RM)
   - IMD –Director General
   - CWPRS – Director
   - CGWB – Chairman
   - NIH –Director
   - CPCB – Chairman
   - BBMB – Chairman

iii. Participating States:
   - Chairperson SLSC from 13 participating States

iv. Representative, Planning Commission:

v. Representative DEA

vi. Invitees
   - To be decided and opted by NLSC

The NLSC will meet as often as required but at least two times a year.

Key Roles

NLSC will provide strategic supervision, policy guidance and steering support for the successful project implementation. The key roles are:

- To provide policy directions to the implementation of project
- To exercise overall administrative, management and financial control of project
- To periodically review and approve the constitution of the Three Project Management Groups, HISMG (Tech), HISMG (IS), and HISMG (DD) set up for operational management of project on behalf of NSLC
- To consider and approve any changes/deviations to the planned programs for project.
- To deliberate and ratify decisions not resolved at the level of the three HISMG
- To oversee and review progress made in implementation of project (this will include Progress Reports and Technical Analysis Reports finalized by HISMG) and make recommendations to SLSC/SIHCC for implementation in the State
- Resolve issues arising out of inter-agency coordination, if any.
- Provide Directions and support to State Level Steering Committees on policy matters related to project
- To constitute special purpose Working Group(s) / Task Force(s) to address specific aspects of the Project as a time-bound activity with a clearly defined deliverable by engaging specialists from the academia/ industry, as required. NLSC may also invite experts / appoint short-term consultant to address specific aspects of the project.
- To appoint experts to carry out an "inside" assessment of the effectiveness of HIS to provide mid-course corrections, if any, and define policies that are needed to keep the system responsive to operator needs for technological improvements

The ToR for NLSC is given in **Attachment 3.1**.

3.3.2 HIS Management Groups (HISMG)

The project management and review functions will be undertaken by the 3 HISMGs focusing on their respective areas of expertise:

- HISMG (Technical)
- HISMG (Institutional Strengthening and Training)
- HISMG (Data and Data Dissemination and Co-ordination)

The key roles to be performed by the HISMG are:

- Advisory support to NLSC
- Reviewing and monitoring progress of project implementation and reporting to NLSC
- Recommending policy, standardization on implementation guidelines
- Co-ordination among IAs in the respective functional areas

The HISMG will meet as often as required but will meet at least once in a quarter.

(a) HISMG (Technical)

HISMG (Technical) will focus on technology and technical aspects covering the Vertical Extension activities and purpose driven studies of the Horizontal Expansion component.

Constitution

The HISMG (Technical) will be chaired Chairman CGWB / Member (RM), CWC on a rotational basis.

The other members are:

i. Central Agencies: One Senior Representative each of:
   - CWC
   - IMD
   - CWPRS
   - CGWB
   - CPCB
   - BBMB
   - NIH

ii. Participating States
   - CE / PC of 4 to 5 States. The NLSC will nominate the States to the HISMG and will be for a 2-year term.

iii. Technical Experts
   - One each of SW, GW, and WQ specialist from the Academic Institutions or Government (serving or retired) to be nominated by NLSC

iv. Member-Secretary
   - Director (Technical) from HISCS looking after the sub-components covering the Technology and Technical aspects, Purpose-driven studies and Decision Support Systems, i.e. covering the Vertical Extension activities, and the Purpose-driven studies of the Horizontal Expansion component

v. Invitees
   - Project Manager, TA Consultants
   - Head, selected NGOs (as required)
   - Experts in Hydrology / Water Sector from Academia, Industry, Consultants (as required)
   - Nodal Officer of State Implementation Group - DSS/PDS
   - Representative of NRSA

<u>Key Roles</u>

The key roles are:

- To monitor physical and financial progress of project relating to technology and technical aspects of all the 3 components of the program like, Purpose-driven studies and Decision Support Systems, i.e. covering the Vertical Extension activities, and the purpose-driven studies of the Horizontal Expansion component and consolidation of HP activities
- To review and monitor progress of major consultancy with NIH, BBMB and CWC.
- To advise the NLSC on policy, standardisation and guidelines for best practices.
- To determine slippage in respect of items on critical path and suggest remedial /corrective measures.
- To review the annual work plan and semi-annual progress reports in respect of the sub-components as in 1 above and report this to NLSC.
- To review conflicts, if any, in respect of detailed specifications, tender documents, tender evaluation etc and suggest way forward.
- To consider changes/deviations to the planned programme for project, if any, and seek approval of NLSC.
- To interact with State Level Co-ordination Committees on project related activities pertaining to sub-components as above.

- To constitute special purpose Working Groups/Task Force/ Technical Advisory body(s)for specific technical/data aspects of project with clear defined time-bound programme and deliverable.
- To review the activities/deliverables of the specialist Task Forces/Working Groups set up by itself / NLSC.
- To review the work and recommendations of DSS, Design Aids and any other technical consultancy taken at the National Level.
- To approve honorarium in respect of Experts who participate in the deliberation of HISMG/NLSC/Task Force/Working Group.
- To assist implementing agencies in screening and approving purpose-driven studies and, if necessary reviewing decision Support Systems relevant to project submitted by implementing agencies.
- To monitor and review once in each quarter, the progress of such purpose-driven studies and development of DSS and report semi-annually the progress to NLSC.
- To review specific technical training needs that affect all participating agencies and suggest a way forward to effectively co-ordinate this.
- To encourage NIH and CWPRS to be pro-active in preparing / co-ordinating the proposals with help of project implementing agencies and TA Consultant.

The ToR for HISMG (Technical) is given in **Attachment 3.2**.

(b) HISMG (Institutional Strengthening and Training)

Constitution

HISMG (Institutional Strengthening and Training) will be chaired by Commissioner (HP &MI).

The other members are:

i. MoWR
   - Representative of Financial Advisor
   - Representative of Joint Secretary, Administration

ii. Central Agencies (WR): One Senior Representative each of:
   - CWC
   - NIH
   - CGWB
   - CWRPS
   - BBMB
   - NWA

iii. Central Agencies (Others):
   - Representative of DEA
   - Representative of NRSA

iv. Participating States
   - CE / PC of 4 to 5 States. The NLSC will nominate the States to the HISMG and will be for a 2-year term.

v. Member-Secretary
   - Director (IS & PM) from HISCS looking after the Institutional Strengthening and Training, i.e. sub-components on consolidation of HP-I activities, Implementation Support and all training related activities

vi. Invitees
   - Project Manager, TA Consultants
   - Project Manager, Management Consultants
   - Head, selected NGOs (as required)
   - Director (DD&C)

vii. Domain Experts
   - Specialist Institutional Strengthening Expert
   - HRD (OD and Training) Expert from recognized Government Institution or with Management Consulting Background

Key Roles

The key roles are:

- To monitor physical & financial progress of project covering the Institutional Strengthening and Training, i.e. sub-components on Consolidation of HP-I activities, Implementation Support and all training related activities
- To advise the NLSC on policy, standardisation and guidelines for best practices.
- To determine slippage in respect of items on critical path and suggest remedial /corrective measures
- To review the annual work plan and semi-annual progress reports in respect of the sub-components as in 1 above and report this to NLSC
- To review conflicts, if any, in respect of detailed specifications, tender documents, tender evaluation etc. and suggest way forward to concerned activities.
- To consider changes/deviations to the planned programme for project, if any, and seek approval of NLSC
- To interact with State Level Co-ordination Committees on project related activities pertaining to sub-components as above
- To constitute special purpose Working Groups/Task Force/ Technical Advisory body(s)for specific technical/data aspects of project with clear defined time-bound programme and deliverable
- To review the activities/deliverables of the specialist Task Forces/Working Groups set up by itself / NLSC
- To approve honorarium in respect of Experts who participate in the deliberation of HISMG/NLSC/Task Force/Working Group
- To review the recommendations of the Management Consultants with respect to Process Improvements, Organisational Development, HRD and recommend way forward
- To oversee the efficacy of the workshops to develop ‘soft’ skills and create greater collaboration, commitment and creativity
- To examine the recommendations of Management Consultant and set up Performance Indicators for monitoring Institutional strengthening parameters, including Training
- To review the report of Training Needs Identification and Analysis and decide on priorities for both core and specialized Trainings
- To undertake planned training audits and review career development initiatives of institutional staff and feedback regarding the impact of training on career development.
- To consider and recommend incentives required for retaining trained staff
- To institutionalise M&L and periodic reviews and feedback from IA and HDUG

The ToR for HISMG (Institutional Strengthening and Training is given in **Attachment 3.3.**

(c) HISMG (Data and Data Dissemination)

Constitution

The HISMG (Data and Data Dissemination) will be chaired by Additional Secretary, MoWR

The other members are:

i. MoWR
   - Financial Advisor

ii. Central Agencies (WR): One Senior Representative each of:
   - CWC
   - NIH
   - CGWB
   - CPCB
   - BBMB
   - IMD
   - CWPRS
   - NWA

iii. Participating States
   - CE / PC of 4 to 5 States. The NLSC will nominate the States to the HISMG and will be for a 2-year term.
   - Representatives of HDUG
   - Chairperson of Central HDUG and 3-4 other State HDUG to be nominated by NLSC in rotation
   - Member-Secretary
   - Director (Data Dissemination and Co-ordination) from HISCS covering the Data-use and Dissemination, i.e. 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

iv. Invitees
   - Project Manager, TA Consultants
   - Head, selected NGOs (as required)
   - Experts in use of Hydrology data from Academia, Industry, Consultants (as required)
   - Representative from Ministry of Information Technology/NIC

Key Roles

The key roles are:

- To monitor physical and financial progress of project covering the data-use and dissemination, i.e. 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
- To advise the NLSC on policy, standardisation and guidelines for best practices.
- To determine slippage in respect of items on critical path and suggest remedial /corrective measures

- To review the annual work plan and semi-annual progress reports in respect of the sub-components as in 1 above and report this to NLSC
- To review conflicts, if any, in respect of detailed specifications, tender documents, tender evaluation etc and suggest way forward for concerned activities.
- To consider changes/deviations to the planned programme for project, if any, and seek approval of NLSC
- To interact with State Level Co-ordination Committees on project related activities pertaining to sub-components as above
- To constitute special purpose Working Groups/Task Force/ Technical Advisory body(s)for specific technical/data aspects of project with clear defined time-bound programme and deliverable
- To review the activities/deliverables of the specialist Task Forces/Working Groups set up by itself / NLSC. To promote the use of hydrology data to the maximum level possible, recommend Policy statements and standard guidelines to mandate use of the HIS data base for the design of new projects
- To approve honorarium in respect of Experts who participate in the deliberation of HISMG/NLSC/Task Force/Working Group
- To evolve policy guidelines for categorization of data as 'fit-for-public use' and 'data -for-restricted-use' and promote, in the case of data 'fit-for-public use', wide scale data transparency throughout India and making data available to users, with rational pricing mechanism wherever required so that the agencies move towards full and open access of HIS data by all users, including those in other states
- To provide focus of project proposals on critical water sector issues and use of a multi-disciplinary, demand-driven, problem-oriented approach involving all concerned state agencies/institutions
- To function as the nodal agency to support the efforts of the Central and State Hydrology Data Users Group

The ToR for HISMG (Data and Data Dissemination) is given in **Attachment 3.4.**

3.3.3 HIS Co-ordination Secretariat (HISCS)

The hands on day-to-day managerial support for operational, implementation and co-ordination aspects of the project will be entrusted with HISCS. HISCS will be the key nodal agency at the national level.

Constitution

- The HISCS will be headed by a Commissioner of MoWR
- The Head, HISCS will be assisted by a full time multi disciplinary team drawn from the participating Central Agencies of MoWR.
- There will be 3 Director level experts with their personal staff, drawn from MoWR/CWC/CGWB/NIH etc.:
  - Director (Technical)
  - Director (Institutional Strengthening and Project Management)
  - Director (Data Dissemination and Co-ordination)
- The other staff of the HISCS are:
  - 1 Officer from each participating Central Agency at Deputy Director level
  - 1 Field Level Officer (Junior Technical Grade) drawn from each Central Agency
  - 1 Procurement Officer

- 1 Finance Officer with supporting staff
- Section Officer (Administration)
- 7 Support Staff

Key Roles

The key roles are:

i. Head, HISCS

- Be in charge of overall project implementation
- Act as Member Secretary to NLSC
- Administrative Head of the staff members

ii. Directors

- Act as the Member Secretary of the respective HISMG
- Remain accountable to NLSC and HISCS for co-ordinating, implementing and monitoring the respective project components
- Be responsible for following up of the decisions of NLSC and HISMG in the respective functional areas

iii. HISCS

- Overall project implementation, monitoring, co-ordination and project performance with the help of management consultants, technical assistants and Central Agencies
- To function as the Secretariat for NLSC and HISMG
- To follow up implementation of the decisions of the NLSC and HISMG
- To act as a Central Co-ordinating Agency to interact with the SLSC, SHISCS and SHO
- Procurement Officer to be nodal officer to facilitate and track all procurements, and advise concerned Directors on procurement norms
- To be responsible for first level conflict resolutions between States; points that can not be resolved at his level to be referred to HISMG/NLSC as required
- To provide co-ordination support to all Project activities, as required
- To be empowered to use individual/institutional expertise in public/private sector and academic institutions, as and when needed

Evolving Roles of HISCS

The HISCS Team will function as a transition Management Team to propagate the key change initiatives and learning from the project within their respective departments. The HISCS is expected to internalise the capacity required for setting up of a Water Information Cell/National Hydro Informatics Agency attached to the MoWR. The key responsibility of the management consultant and technical assistant service providers are for managing the transition to set up a permanent, autonomous, multi-disciplinary Water Information Agency attached to the MoWR. The management consultants will examine the need, positioning, roles and responsibilities, reporting relationships, staffing and other requirements etc. of this Agency. A road map for setting up of the National Agency within the project period will also be prepared by the management consultants.

3.3.4 Central Agencies

The Central Agencies will support and work with State Level IAs in areas of the project implementation. The specific implementation management aspect will be overseen by a multi-disciplinary group headed by the concerned nodal officer for activity and representatives of other central agencies, HISCS, and heads of participating units being members.

- CWC and CGWB will focus on their thematic areas of SW and GW, respectively; in terms of training, the National Water Academy (CWC), CGWB, NIH and States' training institutions will be responsible for training in application-specific hydrology, in collaboration with respective state agencies;
- CWPRS will provide advice, training and research on hydrometric instrumentation and could also be selected to undertake specific purpose-driven studies;
- NIH will be responsible for undertaking basic training activities and should be closely involved in the development of design aids and the purpose-driven studies;
- IMD will be responsible for assisting in designing the hydro-meteorological networks and standardization of instrumentation and meteorological data validation, in supervising subsequent maintenance, serve as nodal agency for providing relevant training, and collaborate in the development of related DSS;
- CPCB will 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 and water quality data validation, development of a data bank, quality assurance, purpose-driven studies, DSS development activities, and training and awareness raising activities; and
- BBMB will continue to be responsible for the management and operation of the water resource infrastructure in its mandated area, with the project providing both improved hydrological networks and strengthened operational decision support systems and facilitate training on the developed DSS.

3.4 State Level Agencies

Similar to the National level, the State level also will have a structure to facilitate the 3 levels of management function. The State Level Agencies are:

- State Level Steering Committee (SLSC) for undertaking strategic and policy functions
- State HIS Co-ordination Committee (SHISCC) for undertaking project management and review functions
- State Hydrology Organization (SHO) for undertaking operational management functions

3.4.1 State Level Steering Committee (SLSC)

The SLSC is the counterpart agency at the State level to NLSC. The Chairperson of the SLSC will be a member of NLSC.

Constitution

SLSC will be chaired by the Secretary of the controlling Irrigation or WRD under which the States' surface and groundwater agencies are placed. In case of separate departments handling the surface and groundwater, the State will nominate the nodal Secretary for project who will function as the Chairperson of SLSC and will represent the State's interest in the NLSC; alternatively the Secretary SW and Secretary GW will alternately hold the Chairmanship on an yearly basis. The other members are:

- Other concerned Secretaries/ Additional Secretaries of Water Resources Department
- Central Agencies: State representatives of Central Agencies (where available)
- State Agencies (Others):
  - Representative of Secretary Finance
  - Representative from HP-I State (for Horizontal Expansion States only): optional
  - One invited Member from one of the HP-I States for advisory support
- User Departments:
  - Secretary/Additional Secretary of Departments that are prime users of Water e.g., Environment & Forests, Agriculture, Rural Engineering, Urban / Rural Development, Power, Fisheries, Waterways etc.
  - Representative from State Remote Sensing Agency.
- Invitees:
  - Representative of Task Manager, IBRD
  - Project Manager, TA Consultants
  - Head, selected NGOs (as required)
  - Experts in Hydrology / Water Sector from Academia, Industry, Consultants (as required)

- Member secretary: Project co-ordinator of the State Hydrology Organization

Key Roles

The key roles are:

- To consider policy directions to the implementation of project given by NLSC and adapt these to the State
- To monitor physical & financial progress of project covering all Components and sub-components of project
- To determine slippage in respect of items on critical path and suggest remedial/ corrective measures
- To review conflicts, if any, in respect of detailed specifications, tender documents, tender evaluation etc. and suggest way forward
- To consider changes/deviations to the planned programme for project, if any, and where necessary refer these to NLSC
- To review the annual work programme for project as applicable to the State
- To review the activities of the specialist Task Forces/Working Groups set up by itself
- To resolve issues arising out of inter-agency coordination, if any.

Wherever necessary request the State Government to constitute and Empowered Committee under the Additional Chief Secretary of the State/ Additional Secretary at the Central Agency level to approve project related procurements.

3.4.2 State HIS Co-ordination Committee (SHISCC)

Constitution

The SHISCC will be constituted at the state level for better co-ordination between the participating agencies. The Engineer in Chief/Director of the concerned Irrigation or Water resources department will chair the SHISCC. In states where surface water and ground water IAs report to more than one Secretary, the Chair will rotate annually between the Engineer in Chief and Director, Ground Water.

The other members are:

- All state level participants of HP-II within the state
- Representatives of Central Agencies, NIH, CWPRS, CWC, CGWB and IMD

The SHISCC in the 4 new States will include one representative (CE/SE) from at least one of the existing HP-I states.

Key Roles

The key roles are:

- To co-ordinate, manage and review implementation of HP-II activities at the state level.
- To ensure compatibility of procedures, formats, protocols etc. between the Central and State Agencies
- To promote Special Interest Groups (SIG) in each data centre for undertaking hydrologic analysis projects, publish and disseminate results, thereby encouraging better interaction among ground water, surface water and water quality specialists.

3.4.3 State Hydrology Organization (SHO)

The SHO will be the State level Nodal Agency responsible for implementing the project activities in the States with the following objectives:

- To aim towards consolidation of HIS both for SW and GW data centers into a single unified State Water Data Centre that will facilitate conjunctive planning of Surface and Ground water, and move towards IWRM; and
- To create a team that through association with the TA Consultants and National level co-ordination and co-operation will attain sufficient learning to take the tasks forward in the State without the future handholding support of the Consultants.
- To decide on the nodal agency for DSS/PDS in the State in a project mode with proper linkages

Constitution

In the HP-I States, the SHO (either singly or separately for SW and GW) were established along with the data centres, and these will continue with the project implementation, with suitable strengthening of staff. In the case of the Vertical Extension component, the SHO will be strengthened with a 'Vertical Extension' Cell drawn from

personnel of the Planning and Design units of the SW and GW agencies. These will be given structured training on the tools, systems and processes that were developed in HP-I. In the new Horizontal Expansion States, a dedicated team will be set up to function as the implementation team and this will grow to become the SHO.

For the purpose of project, the CE of the SHO will be designated the Project Co-ordinator for the State. In States that continue to have separate SW and GW Departments, there will be at most two Project Co-ordinators (PC), one for SW and the other for GW. The work of the participating Central agencies in the State will be co-ordinated by the PC-SW or PC-GW, as applicable. Representatives of the participating Central Agencies who have offices in the State or Regional Centre will function as the nodal officer of their agency and coordinate their respective activities in the State with the State PC. A dedicated full time secretariat within the SHO will be created for facilitating and monitoring the implementation of project activities. A Transition Management Team (TMT), with representatives of all participating agencies will also function in the SHO secretariat for imbibing knowledge and training through close working and coordination with the TA and Management Consultants.

In the States that are joining in as part of Horizontal Expansion, there will be commitment from the State Government to constitute a dedicated full time SHO team (integrated for SW and GW or two separate teams for SW and GW, as applicable to the State) and assign the personnel to this team before the onset of the project in a manner satisfactory to the Bank. It is important to involve the State Water Planning and Design Departments in the implementation team through suitable representation in the SHO implementation team. The States could also explore the possibility of having a section of the planning and design Directorate to be designated as the implementing agency.

PC of participating states will exercise full administrative and technical control of their respective components. A dedicated full time secretariat within the SHO will be created for facilitating and monitoring the implementation of project activities. PC will function as the Head of this secretariat and will be accountable to the SHISCC and SLSC for the implementation of project in the State. The incremental staff supported by project will include the CE, one Training coordinator, one procurement specialist and two supporting staff.

The co-ordination between IAs is planned to be suitably strengthened through electronic information exchange between them through a fully connected network and computerised MIS. These teams will be suitably trained on use of electronic messaging (e mail), workflow and groupware systems and on suitable formats for information exchange to monitor HP II progress and reporting, during the early stages of the Project.

Each SHO will have 1 Project Co-ordinator, 1 Training Co-ordinator, 1 Procurement Specialist and 2 Support Staff.

By end of project, it is intended that the States will move towards the reorganization of separate data-collection organizations within the State into one hydrologic organization, with groundwater, surface-water, and water-quality programs collated.

Key Roles

- The overall project implementation, monitoring, co-ordination and project performance with the assistance from Management Consultants, Technical Assistants and Central Agencies
- Responsible for day-to-day administration and management of project implementation and all routine activities
- Project Secretariat for SLSC and responsible for scheduling meetings, generating Action Points emerging from the meetings and reporting on the progress of the Action Points
- Finance and Accounts person to be trained on Financial Management Manual and Financial Reporting as per IBRD and GoI requirements and guidelines
- Procurement Officer to be nodal officer to facilitate and track all procurements, and advise on procurement norms
- All Nodal officers to be responsible for co-ordinating and interacting with their respective National agencies for their respective components of project
- PC responsible for first level conflict resolutions between participating IAs; points that can not be resolved at his level to be referred to SLSC
- SHO to provide co-ordination support to all Project activities and interactions/support to HDUG

3.5 Implementation Group – DSS/PDS

Suitable implementation group for implementation of each works under DSS and PDS will be constituted as an effective implementation management arrangement. The specific implementation management aspects will be overseen by the group headed by the Nodal Officer for the particular work item with members from the related Central Agencies, State Departments, R&D institutions and Universities in the States. The Constitution of the Groups will be firmed up keeping in view the requirement of work and linkages at suitable stage of implementation to be carried out with the help of consultants.

3.6 Hydrology Data Users' Group (HDUG)

The project will strengthen the HDUG set up at the central and state level during HP-I to promote the user of HIS. These will be strengthened and promoted through decentralization and expansion up to the division, sub-division and field levels. Advisory and co-ordination support to make these groups more proactive and to help them network better with other state HDUGs and national/international agencies with similar interests will be provided by HISMG (D&D).

Restrictions in membership of HDUG will be minimized and end users i.e. WUA, farmers, industries, NGOs, watershed agencies, academics, professional interest groups, media, political groups, other state departments and agencies that are directly or indirectly associated with water, and non-project states will all be invited to join HDUGs. The functioning of HDUG will be made more informal, with a democratic status, and a membership fee. The HDUG will be encouraged to network with international organisations engaged in similar work, to organize meetings of Special Interest Groups, tutorials, symposia and workshops at their Data Centers with invited experts, and to publish the proceedings of such activities. Central HDUG will assist the state HDUG in this initiative and join forces with them. The HDUGs will facilitate training to users on data collection, use of hydrology

data for water conservation and IWRM, hold public awareness workshops, and give HIS more visibility through the media and press releases.

3.7 Government Orders

Based on the constitution and key roles the State Governments and Government of India will issue necessary notifications. Some of the State Governments have already issued Government Orders to this effect.

The Resolutions issued by MoWR, Government of India on constituting various National Level Committees are given **Attachment 3.5**.

3.8 Technical Assistance

The HP-I was successfully implemented with a very effective Technical Assistance Consultancy component. The proposed project aims to build on from the achievements of HP-I and aim to widen the application of HIS into higher levels of nation wide Decision Support Systems. The project also aims appropriate institutional development to build the human resource capacity of the IAs.

In all areas where there will be a gap of capacity will be bridged by hiring consultants who will assist the IAs in implementing the different components of the project. The consultancy support is not mere advisory nature but will be for handholding as well as turnkey implementation of such areas where expertise will be essentially required. The methodologies to be adopted by the consultants will be such that, there is total transfer of technology and internalisation of competencies within the IAs.

The different consultancy supports required for project implementation are summarised in *Table 3.2*.

Table 3.2 Consultancy Support Services

Sl. No	Areas of Service Support	Nature of Consultancy	Key tasks to be performed
1	Organizational Development of IAs and Project Management	Management Consultants	• Supporting HISCS for project planning, budgeting and project implementation • Institutional Strengthening and Capacity Building • Organization Development and Human Resource Development • Formulating the strategy and road map for sustainable National and State Level Hydro Informatic Centres • Implementing Financial and Accounting Systems • Assisting the procurement of goods and services by the IAs • Identifying the service support requirements of IAs • Developing a strategy to promote HIS data use, spreading awareness and knowledge management activities and implementing them • Developing and implementing an effective monitoring, evaluation and learning systems and working out performance indicators for the project • Providing assistance to decide strategy for project implementation like, consultancy requirements, outsourcing requirements, other support services etc. • Project monitoring including the work of other consultants

Sl. No	Areas of Service Support	Nature of Consultancy	Key tasks to be performed
2	Implementation Support for Horizontal Expansion component	Technical Assistance	• Assisting the 4 new States, new Central Agencies and PCS to implement all activities as implemented during HP-I • Assisting HISCS and HISMGs in the general management and co-ordination of project implementation for development, maintenance of HIS • Preparing annual work plans and budgets • Assisting in identifying studies to be taken up • Assisting the 9 existing States and Central Agencies in software and hardware upgradation through HISCS • Assisting in planning and execution of remote sensing and GIS Strengthening
3	Decision Support System for planning and management of Water Resources	Technical Assistance	• Needs Assessment • DSS Model Selection • Generic DSS Development • Database Development • Development of the database by the state technical teams • DSS Customization • DSS Testing/Refinement • DSS Application • DSS Evaluation/Fine-tuning/Sustainability • Dissemination/Training • Development of an effective outreach plan
4	Decision Support System Development for Real Time Operation Management	Technical Assistance	• Planning for activities, procurement schedules, monitoring and evaluation, implementation programme, specifications etc. -As Above (3) -
5	Support for Development of Design Aids in surface water, ground water, water quality and un-gauged catchments	International/ National Technical Assistance for surface water, ground water and water quality	• Developing a program for implementing the sup-component in collaboration with IAs • Developing uniform techniques and comprehensive manuals summarising recommended methodologies along with solved examples for each recommended technique • Assisting the Central/State IAs in developing their own regional design aids using the available HIS database • Training the staff members of the IAs in the use of recommended methodologies • Assisting developing/procuring additional software required and train the staff of IAs
6	Technology Upgrading in Remote Sensing and GIS Software, Data, Tools and Applications	Technical Assistance	• Assisting the IAs in the planning and execution of GIS and remote sensing activities required for the implementation of institutional strengthening and Vertical Extension components • Assisting the IAs in developing standard and customized spatial data and information products of HIS for dissemination • Building the capacity of the new IAs in GIS to support HIS operations • Assisting in developing in remote sensing and GIS capacity to support development of hydrological design aids, decision support system and purpose driven studies through spatial data inputs and outputs and analysis.

3.9 Logistical Support

The project will provide logistical support to improve the working conditions and office environments of the IAs. This will include facilities for improved communication between IAs, under which electronic connectivity between the IAs will be established and their personnel trained on electronic messaging (e-mail), groupware and workflow systems. In addition, the provision of personal computers, fax machines, photocopiers and other equipment will also be included, and additional vehicles (purchase or hire) will also be financed. Structured MIS formats will also be designed for exchange of periodic information between participating agencies.

3.10 Human Resource Development Strategy and Capacity Building Programs

The Human Resources Development include developing the skill and competencies of personnel at all levels of the project implementation. It will also include appropriate performance appraisal mechanism. The management consultants will develop capacity building plan for the project. The proposed strategies for capacity building will follow a cascade approach of training of trainers so as to increase the out reach. State level, National level and International training institutions will be identified to deliver the training programs. The capacity building plan will be prepared after a thorough analysis of the training needs based on the experience of HP-I and also the roles expected to be performed by the personnel at different levels for project implementation. The HIS Management Group (Institutional Strengthening and Training) will take the lead role in developing the training and capacity building programs. The implementation of the capacity building plan will be the responsibility of HISCS with the assistance of Management Consultants and Central Agencies.

Chapter 4

Financial Management

Compared to HP-I, the proposed project will have a financial management framework strong enough to ensure the following aspects:

- Ensuring accuracy, prudence, accountability and transparency at all levels – State, National and Central Agencies
- Capable enough to meet the financial reporting and audit requirements of State Governments, National Governments and IBRD
- Monitoring the financial progress through well defined financial performance indicators by setting up a Financial Information System and preparation of a Finance Manual

4.1 Lessons learned from HP-I

The proposed project will take measures to bridge the gaps in financial management identified during the implementation of HP-I. These measures are summarized in *Table 4.1*.

Table 4.1 Measures to strengthen Financial Management in HP-II

Key learning from HP-I	Proposed FM Measures in HP-II
• No finance personnel in Project Co-ordination Secretariat and hence no financial monitoring	• Providing a full time finance person in HISCS • Involvement of Integrated Finance Department of MoWR.
• There was no internal auditing	• Internal audit by Integrated Finance Department
• There was lack of uniformity in financial reporting • There was uniform financial management guidelines for IAs	• A Financial Management Manual is proposed • Standardized policies and procedures for financial management for the IAs • Standardized reporting formats are being prescribed for IAs
• There were too many audit reports	• HISCS will have the responsibility of following up with the IAs for timely submission and compilation of all audit reports • A ToR will be agreed with project auditors both C&AG and State AGs

4.2 Financial Management

The implementing States and Central Agencies 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 some of the states by instituting a computerized Financial Management System (FMS). This will be web-enabled and will be linked to the State Finance Department with the Finance Wing of the Ministry of Water Resources (MoWR). The FMS will be piloted in two States with adequate staff capacity. The pilot states will be identified soon. This program of computerization is a MoWR initiative, undertaken to strengthen its oversight role. The departments will use the proposed computerized system even after the project is over. However, the existing manual system is considered sufficient to meet the reporting requirements of the project.

4.3 Staffing

The finance function of the project will be headed by the Financial Advisor of the Integrated Finance Department of the MoWR. He/she will be assisted by the Controller of Accounts. This apart, a finance officer of the rank of Under Secretary/Deputy-Controller of Accounts with support staff will be placed in HISCS and will be assigned full-time to the project. This team at the Central Ministry will be responsible for establishment of the agreed financial management arrangements and have an oversight function. At the State/agency level, the departmental/agency finance wing will be responsible for the finance function. One of the strengths of the HP-II project is that the project is being implemented in 9 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 be trained.

4.4 Disbursements and Fund Flow

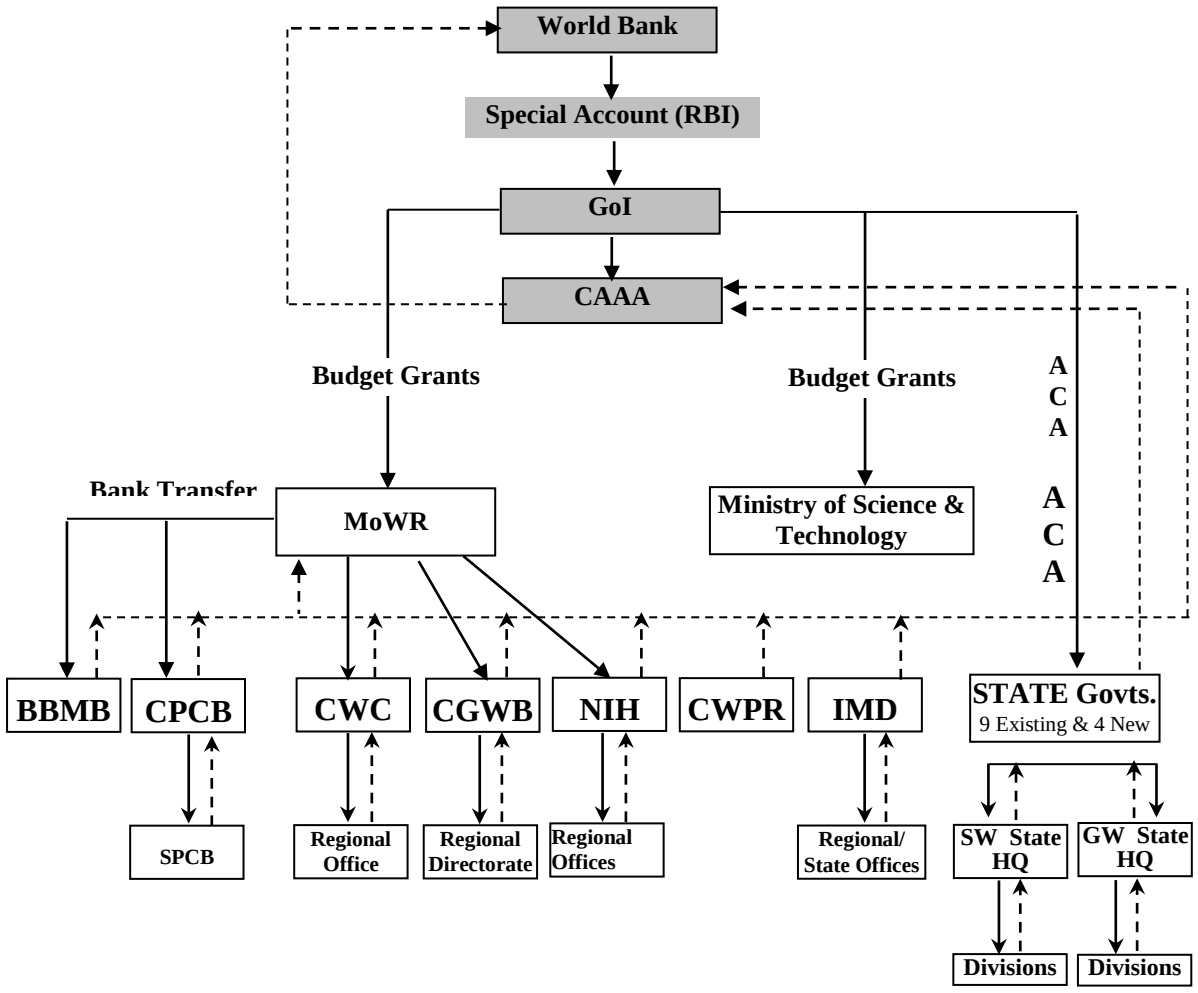
GoI would open a Special Account with RBI to receive the initial deposit and thereafter reimbursements from the Bank under the project and would make the funds available to the States under the usual Additional Central Assistance (ACA) mechanism on a 70% loan and 30% grant on a periodic basis. The funds 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 States and their divisions (district units), to the 8 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 through draft by MoWR (not yet formally informed to us). 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 CAAA with a copy marked to HISCS. (Similar arrangement was being followed in HP-I. The Ministry of Water Resources is of the opinion that since there are 21 implementing agencies, consolidation of claim at HISCS level may delay the fund-flow process and therefore same arrangements as in HP-I should continue). Initial funds will flow to all implementing States and IAs. In the new States, to begin with the Hydrological Information System will be established in the Surface and Ground Water Departments, which has already been done in the old States under HP-I Project. The old States on the other hand will be undertaking activities to move over from development of HIS (achieved in HP-I) towards use of HIS in water resources planning and management. Each State and Central Agency will get funds based on their approved work plans 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 Categories as detailed in *Table 4.2*.

Table 4.2 Disbursement 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	15.27	80% until June 30, 2006 75% until June 30, 2007 50% until June 30, 2008 25% until June 30, 2009 0% thereafter
6. Front End Fee	1.05	Vide section 2.04 of the Loan Agreement
5. Unallocated	9.50	
Total	**105.51**	

The schematic fund flow is shown in *Figure 4.1*.

Figure 4.1 Fund Flow Schematic Diagram



4.5 Information Systems

The current manual system of recording and reporting expenditures, which is considered adequate to meet the reporting requirements during the project, is proposed to be enhanced by a computerized FMS. This software will be piloted in a few states where the departments have appropriate staff capacity. The system will be web-enabled and will link with the State Finance unit and with the finance wing of MoWR and HISCS. The proposed Financial Management System will 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.

4.6 Finance Manual

A Finance Manual is also being prepared for the project by a consultant. The financial management manual will be an integrated one for the whole project. It will document a uniform set of policies, procedures and financial reporting arrangements, which will apply to all the IAs. It will include a Chart of Accounts linking budget heads with the project cost table structure, formats of various financial and other reports, internal control mechanisms, a budgeting system and the auditing arrangements for the project.

The draft of the Finance Manual will be circulated to all IAs to have their feedback. A training workshop will be held by MoWR, where finance personnel of all States and Central Agencies will be trained on the reporting formats laid down in the finance manual.

4.7 Reporting and Monitoring

Financial reporting from IAs to the HISCS will be on a quarterly basis. The FMR formats are a part of the Finance Manual. HISCS 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. HISCS will use the existing software under HP-I for this purpose although this will need to be customized to meet the expected requirements.

4.8 External 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. Terms of Reference for the C&AG/AG will be drafted in line with the Bank's new audit policy and will be agreed. 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 HISCS which will compile the agency-wise 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 *Table 4.3* contains the details of audit reports to be monitored.

Table 4.3 Details of Audit Reports

Audit Report	Implementing Agency	Due date
Project Financial Statements	A single compiled report of 13 States and 8 Central Agencies	September 30
Special Account Reconciliation	DEA/GOI	September 30

4.9 Internal Audit

In addition to the external audit, an internal audit 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, will be promptly and timely addressed by the IAs.

4.10 Retroactive Financing

Retroactive financing up to 5% of the project cost will cover eligible expenditure for relevant project activities incurred before the date of loan signature, but after January 1st, 2004.

4.11 Incremental Operating Cost

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

4.12 Financial Covenants

Besides the usual conditions of audit and FMRs the following activities will be undertaken as part of Implementation Program**:**

1 MoWR shall maintain throughout the project period dedicated desk in the Integrated Finance Department to handle the finance functions.
2 The pilot States for implementation of the financial management software should be identified within three months of the appointment of the TA consultant. The consultant for developing the FMS should be employed within six months thereafter. The software should be fully implemented in one of the pilot States by 2007.
3 The first internal audit report should be submitted to the Bank within the first 9 months of project implementation.

Chapter 5

Procurement

The proposed project being a follow on of HP-I, most of the States and Central Agencies will be having staff who have gained experience in procurement skills.

5.1 Procurement Rules

Goods and works to be financed under the project will be procured in accordance with the Guidelines for Procurement under IBRD Loans and IDA Credits, May 2004 . Consultants' Services financed by the project will 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, will 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) will be published in the UN Development Business (UNDB) on-line and print version after the appraisal mission. The Commissioner (HISCS) will be listed as the contact. All ICB contracts, including pre-qualification notices, and contracts for consulting services estimated to cost more than US$ 200,000 or more, will be advertised in UN Development Business (UNDB) on-line and in the Market of Development Gateway.

5.2 Procurement Methods

Project will support activities under the three envisaged components, namely, Institutional Strengthening, Vertical Extension and Horizontal Expansion. A procurement plan for the first 18 months has been prepared.

5.2.1 Civil Works (Base cost: US$ 16.8 million)

(i) National Competitive Bidding (NCB)

NCB of the project would support buildings, 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. Therefore most of the Civil work under the project would be procured following NCB procedures in accordance with the provisions of the paragraph 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, river augmentations 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$ 10,000 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 a last resort.

5.2.2 Goods and Equipment (Base Cost: US$ 40.3 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, 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$250,000 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$ 8.6 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. State Government rate contract, or direct procurement through Super Bazaar/Janata Bazaar are not 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$ 5.1million):

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. Materials and small equipment costing less than US$500 up to an aggregate of US$0.6 million could be procured through Direct Contracting procedures.

All NCB Contracts for works and goods to be financed from the proceeds of the credit shall follow the following procedure:

- Only the model bidding documents for NCB agreed with the GOI Task Force (and as amended from to time) shall be used for bidding.
- 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.
- 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.
- Except with the prior concurrence of the Bank, there shall be no negotiation of price with the bidders, even with the lowest evaluated bidder.
- 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.
- 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.
- 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.
- The two-or-three envelope system will not be used.

5.2.3 Technical Assistance, Studies, Training and Workshops (Base Cost: 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 piloting real time flood forecasting 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), and Selection based on Consultants Qualification (CQ) methods. Where appropriate Individual Consultants (IC) would also be hired.

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. All would be hired following QBS procedure. The ToRs are being finalized for clearance by the Bank.

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 Least Cost, Quality Based, and Sole Source or on the basis of Consultant's Qualification.

5.3 Disbursement Profile

The year wise project cost profile and corresponding disbursements are presented in *Table 5.1*.

Table 5.1 Disbursement Profile

Year	Project Cost (US$ Million)	% of Project Cost	Corresponding Disbursements[1] (US$ Million)	% of World Bank Financing
Year 1	15.81	11.71%	6.88	6.52%
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	13.43	9.94%	11.39	10.80%
Total	**135.05**	**100.00%**	**105.51**	**100.00%**

Source – Project Appraisal Document

5.4 Review by the Bank of Procurement Decisions

5.4.1 Procurement Planning

The proposed Procurement Plan for the project shall be 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.

5.4.2 Prior Review

All ICB contracts for goods estimated to cost more than US$250, 000 will be subject to prior review. First two NCB contracts for Goods estimated to cost US$ 50,000 equivalent and works contracts estimated to cost US$ 30,000 in each implementing agency estimated to cost of more than US$30,000 and all contracts estimated to cost US$ 500,000 equivalent 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$100,000 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.

5.4.3 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 4 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.

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

5.5 Procurement Information

Procurement information will be collected and recorded as follows:

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

5.6 Proposed Procurement Arrangements

The project elements, their estimated costs and proposed methods of procurement are summarized in *Table 5.2* below. The Figures in parenthesis are the respective amounts to be financed by IDA/Bank.

Table 5.2 Proposed Procurement Arrangement

(US$ Million)

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)**

Source – Project Appraisal Document

5.7 Thresholds for Procurement

The upper limit of threshold values for different categories of expenditure, the procuremnet methods and details of the prior reveiw by IBRD are given in *Table 5.3*.

Table 5.3 Procuremnet Thresholds

Expenditure Category	Contract Value Threshold (US$ millions)	Procurement Method	Contracts Subject to Prior Review
1. Works	(i) Contracts of value more than US$ 30,000	National Competitive Bidding	Fist two contracts of each IA and all contracts above US$ 500,000
	(ii) Contracts of value <= US$30,000 equivalent	Shopping with public bid opening	All contracts Post Review
2. Goods	(i) Contracts of value >= US$250,000 equivalent	International Competitive Bidding	All contracts above US$ 250,000
	(ii) Contracts of value >= US$50,000 equivalent and <US$250,000 equivalent	**National Competitive Bidding**	**First two contracts of each IA**
	(iii) Contracts of value less than US$ 50,000 or less >=	**Shopping**	**All contracts Post Review**
	(iv) Contracts of value less than< US$10,000 equivalent and data	Direct Contracting	All contracts Post Review
3.Consulting Services	(i) Firms (ii) Contracts >= US$200,000 equivalent	Quality and Cost Based Selection (QCBS)	all contracts
	(ii) Contracts < US$200,000	QCBS, SBCQ, Fixed Budget Selection and Least Cost selection	TOR and shortlist to be prior reviewed
	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	TOR to be prior reviewed

Source – Project Appraisal Document

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

5.8 Initial 18 months Procurement Plan

The procurement schedule for the initial 18 months has been worked out IA wise. The estimated base cost of procurement during the initial 18 months of the project, segregated agecy wise is presented in **Attachment 5.1**. The date of starting the procurement activity for Year – 1 has been assumed as 1st August 2004 and for the Year –2 , as 1st August 2005. The value of procurements during the first 18 months of the project works out to about US$ 29.62 Million (INR 133.3 Crores).

Chapter 6

Implementation Schedule

6.1 Project Duration

The project will be implemented in 6 years commencing July 1st 2004. The expected ending date of the project is June 30th 2010. The expected closing date of the project is December 31st 2010. The effective date for project implementation is September 30th 2004.

6.2 Milestones in Implementation

The Management Consultants will prepare a detailed "road map" for implementation of the activities planned for the project. The key milestones identified for the successful implementation of the project are given in *Table 6.1*.

Table 6.1 Key Milestones for Project Implementation

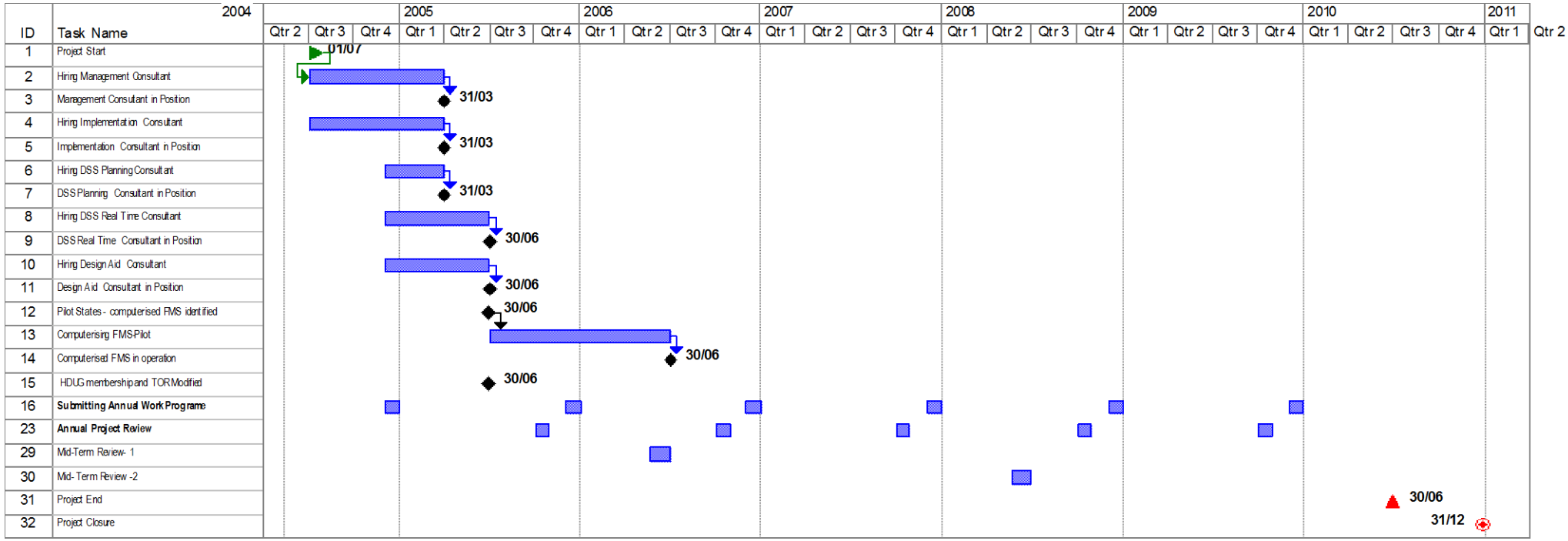
Sl No	Key Activities	By Date
1	Hiring Management Support Consultant	31st March 2005
2	Hiring Technical Assistance for Implementation Support	31st March 2005
3	Hiring Consultants on Decision Support System Development for Water Planning and Basic Operations	31st March 2005
4	Hiring Consultants for Decision Support System Development for Real Time Operational Management for BBMB	30th June 2005
5	Hiring Consultants for development of Design Aids for use by surface Water Agencies	30th June 2005
6	Hiring Consultants for development of Design Aids for use by Ground Water Agencies	30th June 2005
7	Hiring Consultants for development of Design Aids for Water Quality Issues	30th June 2005
8	Identifying two pilot states for implementation of computerized financial management	30th June 2005
9	Establishing computerized financial management in at least 2 project states on pilot basis	30th June 2006
10	Modifying membership and terms of reference for Hydrology Data User Groups	30th June 2005
11	Submitting annual work program with cost estimates and budget proposals	31st December 2004 and thereafter annually
12	Annual Project Review	31st October 2005 and there after annually
13	First Mid Term Review of the Project	30th June 2006
14	Second Mid Term Review of the Project	30th June 2008

Source – Project Appraisal Document

6.3 Project Scheduling

The critical activities to be implemented for the project showing detailed duration and milestone dates to be achieved are presented in *Figure 6.1*.

Figure 6.1 Project Scheduling – Hydrology Project - II



Chapter 7

Monitoring and Learning

The proposed institutional arrangement for the project is a multi state and multi agency model. In order to achieve orchestrated performance by all the Implementing Agencies and MoWR, which is the co-ordinating agency, timely and accurate, flow of information on all aspects of project implementation is very critical for success. Continuous monitoring and incorporation of the learning from the project into the overall policy and vision of Government of India will assume importance in achieving the longer term goals of attaining country wide Integrated Water Resources Management.

7.1 Components Monitoring

The project will monitor the outcomes and results of each of the components and sub-components. This will cover:

- Physical and financial progress of works under Vertical Extension and Horizontal Expansion components, and institutional development activities in IAs;
- DSS and supporting infrastructure; and
- 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 the project components, a separate Monitoring and Learning (M&L) system will be developed under the respective project consultancies. These will be fully integrated into 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.

7.2 Process Monitoring

The project implementation is expected to follow a process approach for flexibility in implementation and full involvement of the implementing institutions. Such an approach will bring about more partnerships, collaboration and team co-ordination among IAs. The process monitoring will ensure mid course corrections and adjustments required during project implementation based on implementation experience. It will help the IAs to adapt to the changes in the way the water sector project planning and management is undertaken. The proposed continuous process monitoring will consists of :

- A self-monitoring mechanism for IAs and HDUGs including staff training and implementation support
- Developing and implementing a user-feedback mechanism including user satisfaction surveys

The Management Consultants will develop and assist the IAs to carry out process monitoring.

7.3 Results Monitoring

The monitoring of the project will be based on a set of outcome indicators and statement of the key results to be expected from each individual components of the project, which are called the intermediate results along with one or two indicators for monitoring. The above monitoring framework is presented in *Table 7.1* called the Results Framework. The Results Framework also show how the indicators will be used during implementation of the project for mid term corrections and also for long term decision making.

Table 7.1 Results Framework

PDO	Outcome Indicators	Use of Outcome Information
Extend and promote the sustained, effective use of the existing Hydrologic Information System 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 8 Central Agenceis	HIS mainstreamed by 90% of IAs and consistently used by them, as well as other HDUG members and individuals, for their planning and design requirements;	**YR1-YR3**: (i) monitor and evaluate achievements on institutional and attitudinal changes on water management; **YR3-YR5**: (i) develop procedures and establish protocol in the data use in investment planning to project planning and design; (ii) Determine if strategy for mainstreaming HIS, design aids and decision support systems in water resources departments needs to be modified. **YR4:** MTR to confirm if initial design assumptions are valid and provide suitable adjustments within overall project scope . **YR5-YR6**: Consolidate the outcome for mainstreaming program and evaluation
Intermediate Results One per Component	**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 for HDUG needs.	**Component One:** IAs with requisite trained staff in place and HIS fully operational, fully-equipped and provided with adequate O&M funds; proactive HDUGs in place and representing all water resource stakeholders well.	**Component One:** PY 1-5: Low levels may flag 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 related water resources planning and management work, 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 and are being replicated through in-house expertise. (c) Nos. and type of private sector entities using HIS data and design aids.	**Component Two:** PY 1-5: Will enable identifying the issues in pace of development of various activities in each agency to effecting course correction. Will also enable initiating mainstreaming HIS in the water resources department and intensify data use by private sector.

Intermediate Results One per Component	Results Indicators for Each Component	Use of Results Monitoring
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); (b) Numbers and type of private sector entities using HIS data in the four states.	**Component Three:** Will flag success of consultancy and agencies' pro-activity in building up the necessary capacity. Will also identify bottlenecks in mainstreaming HIS and flag issues related to data use by the private sector.

The institutional and data collection arrangements along with responsibility for data collection for integrating monitoring and evaluation based on results are presented in **Attachment 7.1**.

7.4 Project Evaluation

The Management Consultants supported by other specialized consultants as necessary will carry out the various evaluations during project implementation as detailed in *Table 7.2*. :

Table 7.2 Project Evaluation

Name of Review	Timing	Nature of Review	Purpose
Base line Survey	Star of the project	Baseline	To assess pre-project baseline situation
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
Project Completion Review	End of the Project	Impact assessment	To assess the major outcomes and impact of project implementation

7.5 MIS

The Management Consultants will develop and implement a comprehensive Management Information System for meeting all the monitoring requirements of the project implementation including financial progress. The MIS will be an improved version of what has been developed during HP-I.

HYDROLOGY PROJECT PHASE – II

(HP-II)

PROJECT IMPLEMENTATION PLAN

GOVERNMENT OF INDIA
Ministry of Water Resources

May 2004
C.S. RENJIT PIP Consultant

Table of Contents

List of Figures and Tables

List of Attachments

Abbreviations

AG	Accountant General
BBMB	Bakhra-Beas Management Board
CDO	Central Design Organization
CGWB	Central Groundwater Board
CPCB	Central Pollution Control Board
CWC	Central Water Commission
CWPRS	Central Water and Power Research Station
DoWR	State Department of Water Resources
DSS	Decision Support System
FMS	Financial Management System
GFCC	Ganga Flood Control Commission
GIS	Geographic Information System
GoI	Government of India
GPN	General Procurement Notice
HDUG	Hydrologic Data User Groups
HIS	Hydrological Information System
HISCS	Hydrological Information System Co-ordinating Secretariat
HISMG	HIS Management Groups
HLTG	High Level Technical Group
ICB	International Competitive Bidding
Implementing Agencies	Implementing Agencies
IDA	International Development Agency
IFD	Integrated Finance Department
IMD	India Meteorological Department
IWRM	Integrated Water Resources Management
MoWR	Ministry of Water Resources (Government of India)
NCB	National Competitive Bidding
NIH	National Institute of Hydrology
NLSC	National Level Steering Committee
NWA	National Water Academy
PC	Project Co-ordinators
SHISCC	State HIS Co-ordination Committee
SHO	State Hydrology Organisation
SIG	Special Interest Groups
SOE	Statement of Expenditure
SLSC	State Level Steering Committee
SWDC	State Water Data Centres
ToR	Terms of Reference
UNDB	UN Development Business

Project Summary

Name of the Project	:	Hydrology Project – Phase – II (HP-II)
Country	:	Government of India
Implementing Agency	:	13 State Governments and 8 Central Agencies
Nodal Co-ordinating Agency	:	Ministry of Water Resources, Government of India

The overall **project development objective** will be to extend and promote the sustained and effective use of Hydrologic Information System by all potential users concerned with water resources planning and management thereby contributing to improved productivity and cost-effectiveness of water related investments.

Project Components

The project consists of the following main components and sub-components:

I. Institutional strengthening, covering all 13 States and 8 Central Agencies;
- I.A. Consolidation of HP-I activities in the existing state
- I.B. Awareness raising, dissemination and knowledge sharing
- I.C Implementation support

II. Vertical Extension, covering the existing 9 States and 6 Central Agencies; and
- II.A. Development of hydrological design aids
- II.B. Development of DSS
- II.C. Implementation of purpose driven studies.

III. Horizontal Expansion, covering the 4 new States and 2 Central Agencies (CPCB and BBMB)
- III.A. Upgrading of data collection network
- III.B. Upgrading of data processing and management systems
- III.C. Purpose-driven studies
- III.D. Training

Project Description

The proposed project is a follow on project of Hydrology Project, Phase – I. During HP-I, an Integrated Hydrological Information System providing reliable, comprehensive and timely hydrological and meteorological data relating to 56 parameters was established. This consists of 916 river gauge stations 7912 observation wells and 436 hydro meteorological stations for collecting data on qualitative and quantitative aspects of both surface water and ground water. 390 data centres and 28 data storage centres equipped with specialized hardware and software has been established for data processing, storage and reliable data communication. Sufficient manpower has been trained for HIS operations and user support. In addition to current data some of the states have successfully computerized valuable historic data relating to rainfall and river discharge.

The proposed HP– II project will implement activities towards improved planning and design of water resources development, using decision support tools, design aids and methodologies for planning, designing, operations and management and developing skilled manpower for hydrologic modelling. The project will also expand the coverage of HIS to 4 more States and 2 Central Agencies. The project will assist Government of India and the State Governments to acquire tools, systems and standardized procedures to manage inter-sector water demands more efficiently and equitably. It will also help to plan for and manage extreme hydrologic events such as floods and droughts. Ultimately the project will lead to improved overall program of Integrated Water Resources Management in India.

The project will strengthen the existing hydrological data institutions by upgrading hardware and software capabilities. It will raise awareness among data users and general public by disseminating and sharing knowledge on hydrological information. The project proposes to develop standardized hydrological design aids in surface water, ground water and water quality domains. The use of the data generated under HIS will be further strengthened by the development of Decision Support System for surface water planning ground water planning, reservoir operations, irrigation management, drought monitoring and management and conjunctive use of surface water and ground water. A real time flood management advanced operations Decision Support System in the Sutlej and Beas up-stream basins will be implemented. The project will assist purpose driven studies to develop feasible and cost effective solutions to water management issues, which could be replicated. The project will implement hydrologic data collection network and upgradation of data processing and management capacities in the new States. The project will implement capacity building programs for the personnel of IAs including national and international trainings and study tours.

The overall responsibility for the project implementation will be with MoWR and at the Central level, the National Level Steering Committee chaired by Secretary, MoWR will be the apex body responsible for strategic supervision and policy support. The nodal co-ordinating and operational agency for the project will be a full time, multi disciplinary team - an HIS Co-ordination Secretariat headed by Commissioner, HP & MI, MoWR. There will be 3 HIS Management Groups to provide advisory support on implementation relating to key functional areas of technical, institutional strengthening and data dissemination. A State Level Steering Committee chaired by Secretary, Water Resources of the respective States, State HIS Co-ordination Committee headed by Engineer in Chief/Director of the concerned Irrigation or Water Resources Department, State Hydrology Organization headed by a Project Co-ordinator, Hydrology Data User Groups and a State Level Nodal Office for purpose driven studies and decisions support systems constitute the State level structure of the institutional arrangement.

Management Consultants will support the IAs for designing and implementing institutional development, capacity building, human resources development, finance management systems etc. Technical Consultants and outsourcing arrangements are proposed for hand holding IAs in areas, where internal skills are required to be strengthened and in augmenting capacities.

The Financial Advisor of the Integrated Finance Department of MoWR will head the financial management function of the project. In order to guide the financial management at the State and Central Agencies a Finance Manual is being developed. C&AG for Central Agencies will do the auditing of the project accounts and the respective Accountant General

(Audit) will audit the States. The procurement of goods and services will be in accordance with the guidelines for procurement under IBRD loans.

The project will monitor progress, processes and impacts using a Monitoring and Learning Framework for monitoring results. The project will be implemented over a period of 6 years starting from **July 1st 2004** and ending in **June 30th 2010**. The expected closing date of the project is **31st December 2010**. The effective date for project implementation is **September 30th 2004**.

Project cost estimates

The total cost of the Project including physical and price contingencies is estimated at INR 6,31.83 Crores (US$ 135.05 Million).

Project component	Total cost (INR Million)	US$ (Million)
I. Institutional strengthening	1,938.87	43.09
II. Vertical Extension	2,294.72	50.99
III. Horizontal Expansion	1,022.38	22.72
Total Baseline Cost	**5,255.97**	**116.80**
Contingencies (Physical)	346.84	7.71
Contingencies (Price)	715.45	10.54
Total Project Cost	**6,318.26**	**135.05**

Financing plan:

Source	INR Million	US$ million	Percentage
IBRD	4,936.24	105.51	78.1
Government of India	1,382.02	29.54	21.9