HYDROLOGY PROJECT
CRUCIAL FOR INDIA

PROJECT COMPLETION REPORT

Himachal Pradesh
Irrigation and Public Health Department

Background

Observation and collection of hydrological data is not a new concept in India. Arthasastra, contains reference about measurement of rainfall using a bowl in 4th Century B.C. Before the advent of HP-II, Hydrological data was collected by number of agencies in Himachal Pradesh. However, the primary focus of these agencies was to collected and analyzes data as per their own requirement and no sincere effort was made to create a comprehensive and reliable hydrological data base of the State. There was no systematic mechanism for collection, processing, analysis, storage and dissemination of hydrological data. Besides, no uniform protocol was followed by data collector agencies and there was bid question-mark on the reliability of the data. Moreover, no institutional mechanism existed for sharing of data between various agencies and with other stakeholders. This was a major bottleneck in effective planning of water resource sector in the State.

Introduction

World Bank has approved a credit of US$ 104.98 Million to the Govt. of India for the Hydrology Project-II. (IBRD Loan. No 4749-IN). The total cost of the Project is US$ 135.01 Million. Hydrology Project Phase-I was implemented by nine peninsular State of the Country & 6 Central agencies during 1995-2003. Hydrology Project-II is being implemented in 13 States including 9 States of HP-I & by 8 Central agencies. Himachal Pradesh is one of the 4 new States amongst the participating 13 States. Initially the project was formulated for the period of 6 years starting from April, 2006 . The original closing date of the project 30th June, 2012 was later extended by 23 months to 31stMay, 2014.

Objective

Main objective of Hydrology Project–II is to improve and develop an integrated and comprehensive hydrological data collection and information system for improved productivity and cost effectiveness of water related investments in the country.

Approval

The Project was approved for the State at an estimated cost of Rs.49.5038 Crore. The Administrative Approval & Expenditure Sanction was accorded by the Govt. of H.P. on 14th Mar.,2006.

Project cost table was approved by the World Bank and GoI on the basis of Jan., 2004 prices and unit cost estimated on the basis of similar activities and procurement made by Central and State agencies. Flexibility of cost table was one of the special features of this project which helped State IA to adjust the physical and financial provisions as per the requirement. It not only allowed Himachal Pradesh Implementing Agency (HPIA) to include provisions like automatic weather stations, automatic rain gauges, telemetry etc., which were not a part of the cost table initially, but also accommodated adjustment of physical as well as financial provisions as per need. The project could, therefore,

easily adjust to the price fluctuation in the market over a long span of about 10 years between project formulation and its completion.
Project cost table was revised in year 2009, 2011, 2012 and 2013 .

Project Implementation Setup

State Level HIS Steering Committee, under the Chairmanship of Chief Secretary, was the apex body constituted for effective implementation of the Project in consonance to the guidelines of Pre-appraisal Mission of the World Bank and MoWR. The committee had Principal Secretaries/ Secretaries of Finance, Forest, Power, Irrigation & Public Health, Revenue, Science & Technology and Planning as members. Commissioner, MoWR was special invitee in this committee. Five meetings of this committee were held.

Meeting Number	Venue	Date
1st	H.P.Secretariat	23-04-2004
2nd	H.P.Secretariat	14-09-2006
3rd	H.P.Secretariat	29-07-2008
4th	H.P.Secretariat	20-03-2010
5th	H.P.Secretariat	03-01-2011

Deliberations held in the committee and decisions taken proved very useful in streamlining project implementation as most of the issues concerning state agencies were sorted out expeditiously and close coordination between these agencies could be expedite the pace of implementation.

Signing of MoU with various hydrological data collector agencies for sharing of data was a result of decision taken by this apex body.

For administrative, financial and management coordination between implementing agencies of the State, **State Level HIS Coordination Committee** was constituted under the Chairmanship of Secretary (IPH). Head of the Department and Senior Officers of stake holder organizations of GoI and State were members of this committee. Senior Joint Commissioner, MoWR was special invitee in this committee. Regular progress review was made by this committee to steer the project effectively and efficiently. Issues like availability of sites, outsourcing of services, collection and compilation of historical hydrological data were deliberated upon by this committee and decisions made by the Committee helped Himachal Pradesh Implementing agency (HPIA) to achieve project objective.

Eight meetings of this committee were convened.

Meeting Number	Venue	Date
1st	H.P.Secretariat	11-03-2004
2nd	H.P.Secretariat	26-06-2006
3rd	H.P.Secretariat	19-07-2007
4th	HHH,Shimla	29-02-2008

5th	H.P.Secretariat	21-08-2009
6th	H.P.Secretariat	23-12-2010
7th	H.P.Secretariat	12-12-2011
8th	H.P.Secretariat	18-12-2012

Six Expert Groups for Ground Water, Surface Water, Hydrometeorology, Water Quality, Data Center network and Purpose Driven Studies (PDS) domain were constituted under the Chairmanship of Engineer-in-Chief (IPH) for finalization of network, selection of equipment and other related issues. Representatives of expert Central agencies like CWC, CGWB, CPCB & IMD were members of this committee. HIS network was finalized by these Expert groups. One of the advantages of forming these committees was that duplicity of network, like placing a new rain gauge at a place where already a rain gauge of some other agency existed, was avoided and better management of resources could be achieved.
These expert groups met as under:

Sr. no.	**Expert Group Domain**			
		First Meeting	**Second Meeting**	**Third Meeting**
1	Data Centre	26-11-06	25-06-07	26-05-09
2	Ground Water	12-04-07	09-10-07	27-04-10
3	Hydrometeorology	26-04-07	27-07-09	-
4	Water Quality	09-10-07	-	-
5	Surface Water	19-02-08	-	-
6	Purpose Driven Studies	09-10-07	-	-

Due to availability of hydro power in the State, number of agencies including Independent Power companies have established power projects. It was decide by the Apex Committee to rope in these agencies , as well , being hydrological data collector and user. Two meetings with these companies were held under the chairmanship of Principal Secretary (Irrigation & public Health) at Shimla on **03-03-07 and 17-05-07**. Apart from other useful contribution, this facilitated signing of MoUs for data sharing.

Institutional Reforms adopted in HP-II

Govt. of H.P decided to implement HP-II in Project mode and Project Cell with dedicated field units was created. It facilitated closed coordination between project officers and officials and created pleasant work environment.

Single file pattern was followed throughout the project implementation which results in faster decisions and approvals. Besides, continuity of officer as Project Coordinator, despite change of posting, provided strong focused leadership and guidance to middle and junior level officers during project implementation.

Creation of Hydrology cell

GoHP created Hydrology Project –II Cell for implementation of HP-II vide order dated Apr.,2005, in H.P. Irrigation & public Health Department (I&PH Deptt.) under Superintending Engineer, Water Supply and Sewerage Circle, Shimla-3, as the Nodal Officer, through internalization of 14 posts. Subsequently, 8 more posts of various categories were attached to the Cell.

The composition of the cell is as under:

Category/ Strength	SE	EE	AE	JE	Jr. Hydro geo.	DAO/ Joint Contr oller(Fin)	Supdt . Grad e-I	HDM	DM	JDM	Sr. Asstt.	Clerk	Steno Typist	Other s
	1	1	3	2	1	1	1	1	1	1	2	3	1	3

Field offices setup

Since physical works were required to be executed in various parts of the State, it was initially decided that the same would be got executed by respective field Divisions of I&PH Deptt. under whose territorial jurisdiction these works fell. Accordingly, in October, 2006 , 91 officers/officials from 3 Zonal Offices and other field Divisions, detailed as under, were designated for implementation of the Project .

Category/ Strength	Executive Engineer	Assistant Engineer	Junior Engineer	Sr.Technical Assistant
	3	25	43	20

In Nov. 2007 senior & middle level officers from departments associated with the project undertook a study tour of Gujrat and Maharashtra as these States had performed well in HP Phase I. One of the objectives of this tour was to study the project implementation mechanism of these states. It was observed by the team that dedicated staff deployed for the project was the driving force behind the progress achieved by these two states. The team submitted a report to the GoHP and recommended that a dedicated field setup be put in place for speedy and effective implementation of the Project. The State cabinet approved the proposal and GoHP ordered creation of one division and six sub-divisions, by conversion through internalization in July, 2008. Thus, division office at Shimla and six sub-divisions at Palampur, Santokhgarh, Nurpur, Nahan, Mandi and Shimla started functioning w.e.f Sept., 2008.

State Data Centre

State Data Center, Mandi building was completed in time and it was made functional by shifting part staff from Hydrology Project Cell, Shimla in May, 2012.

MOU for Hydrological Data Sharing:

Sharing of hydrological data among various agencies for easy availability being the soul of the project, it was felt that a formal arrangement for data sharing was required to be put in place.

Accordingly, in the meeting held under chairmanship of Chief Secretary, GoHP for Improved Coordination and Optimization of Sustainable Hydropower Development in the Satluj Basin amongst Power Developers and other relevant agencies, it was decided that power developers shall sign MoU with HP,IPH Deptt. for sharing of hydrological data with HP – II, Himachal Pradesh.

MoU was accordingly drafted and got vetted from law department before formal signing with various agencies in June, 2009.

The signatory agencies are:

1. SJVNL
2. HPSEB
3. HPPCL
4. Yangthang Power Ventures Limited
5. BBMB

Signing of MoU with the various agencies at shimla

6. JP Karcham Hydro Corporation Ltd.
7. Himachal Sorang Power Pvt. Ltd.
8. JP Hydropower Ltd.
9. NHPC
10. NTPC
11. Dr.Y.S.Parmar UHF, Nauni
12. CSK HPKV, Palampur

Cost Table and financial status

Project cost table was revised during implementation to respond to the changes made in the physical provisions and to adjust to the cost inflation during 2004 to 2013.

Cost Component	PIP (Rs. in Lakh)	MTR, 2009 (Rs. in Lakh)	Cost Table, 2011 (Rs. in Lakh)	Cost Table, 2012 (Rs. in Lakh)	Cost Table, 2013 (Rs. in Lakh)
Investment Cost	303843	292257	302222.42	301003	299631.86
Recurrent Cost	191195	202780	201525.80	293856.5	285163
Total Cost	495037.73	495038.42	503748.22	594859.5	584794.86

The year wise position regarding budget, expenditure and reimbursement claims made is as under:

Year wise Expenditure position ***(Rs. In Lakh)***

Sr. No	***Financial Year***	***Expenditure***
1	2006-07	218.59
2	2007-08	303.68
3	2008-09	459.16
4	2009-10	589.71
5	2010-11	823.26
6	2011-12	850.05
7	2012-13	965.62
8	2013-14	1215.93
Total up to 31-03-2014		5426.00

Claim Status

Sr. No	Year	Nos. of Claims	Claim Filed Net Amt.	Claim received
1	2006-07	2	61.44	14.06
2	2007-08	5	189.17	216.25
3	2008-09	12	342.29	327.12
4	2009-10	13	513.59	480.59
5	2010-11	14	486.36	437.93
7	2011-12	12	777.08	858.71
8	2012-13	8	713.99	749.26
9	2013-14	13	1017.31	748.96
	Total up to 31-03-2014	**79**	**4101.23**	**3832.88**

Component Wise Physical Progress

Component I : Institutional Strengthening

1. **I.A. Consolidation of HP I** (This component does not pertain to new IAs)
2. **I.B. Awareness, dissemination and Knowledge Sharing.**
   a. **Strategy and capacity building** (No Provision was kept under this activity)

   b. **Awareness raising and data dissemination**
   Provisions contained in this component facilitated the State IA to develop infrastructure support for building up a sound HIS network in the State.
   .

Awareness Raising and Knowledge Sharing Workshop organized at state Data Center, Mandi

State IA organized 8 awareness raising workshop / functions, detailed as under, wherein participation of key personnel from various organizations was found to be very encouraging and fruitful deliberations were made:

1. Conceptual Workshop on Hydrology Project Phase – II held at Shimla in Aug., 2006
2. One Day Workshop for Financial Management Reporting held at Shimla in Nov., 2007.
3. Awareness Raising Workshop held at Shimla in Feb., 2008.
4. Awareness Raising Workshop held at Dharamshala in Jan. 2009.
5. Awareness raising, dissemination and knowledge sharing activities under HP-II during inauguration of Sub-Divisional Data Centre at Amb, Distt. Una Himachal Pradesh in March, 2012.
6. Awareness raising, dissemination and knowledge sharing activities under HP-II during inauguration of State Data Centre at Dhangsidhar, Distt. Mandi, Himachal Pradesh in April, 2012.
7. Awareness raising, dissemination and knowledge sharing activities under HP-II during inauguration of Divisional Data Centre at Palampure, Distt. Kangra, Himachal Pradesh in May, 2012.
8. Awareness Raising Workshop held at State Data Center, Mandi in Nov., 2013.

State of art conference hall with modern audio visual equipment has been established at State Data Centre, Mandi.

Under this sub component HP-II website for Himachal Pradesh State IA was also developed by providing a link to departmental website.

Based on the data collected under this project Ground Water Year book for 2010-11 and 2011-12 was published. Resource material comprising HP resource CD, WQ guidelines, various technical presentations and other information have been compiled in the shape of electronic form (pen drives / CDs) for distribution among Stake holders.

c. Knowledge / experience sharing and inter-agency collaboration

National and International study tours and training opened a vast horizon of knowledge and exposure to best practices for the people working in the water resource sector. 4 officers were sent for international short course at IHE, Netherland. 4 Inter-State study tour for officers from junior to senior level were organized and State cabinet decision to create an independent field division for project implementation was based on the recommendation of one such tour.

Study Tour at Karnataka

3. I.C. Implementation Support.

a. Management and monitoring support for IAs and PCS

Under this provision officers / officials were regularly sent to various training and workshops organized under HP-II. It helped a lot in achieving trained manpower for effective implementation of the project.

Besides, initiatives were taken by the HPIPH Department to host in-house training programmes in respect of HP-II at Shimla and Mandi, where large number of officers / officials was participated from various part of the State.

b. Technical Consultancy.

In the beginning of the project, provision was kept for this activity in the PIP. But during execution of the project, it was felt that, this activity may not be of much relevancy in this project as support in the form of TAMC was available. Hence, during revised cost table, 2012, its provision was deleted.

c. Logistical support

As the name suggests, this sub minor component had provisions for building up of strong logistical support for the execution of the project. 42 section office and 1 Ground Water Organization office building were constructed under this activity. 20 Jeeps (including Mahidra Scorpio, Bolero and Bolero Camper), 2 cars (1 Maruti SX4 and 1 Ambassador) and 1 vehicle (Bolero Camper Gold) for mounting of multi parameter bore hole logger were also procured.

Ground Water Organization, Una

Procurement of office equipments and training equipments was made for State Data Centre, Mandi and various Divisional/ Sub Divisional Data Centers.

Component II: Vertical Extension

Though the State did not have provisions for this component as HIS network was to be established in the first place, opportunity was availed by way of imparting trainings under DSS planning which would be very useful for future development of support system and building up of HIS data base.

Component III: Horizontal Extension

1. **III. A. Upgrading of data collection network**

a. River gauging sites

Various activities, provisions and their status under this component is tabulated below:

Activities	Provisions as per Revised Cost Tables 2013	Status
New River Gauge stations (Standard Gauge)	35	Established.
New RG stations (Automatic Water Level Recorder – Cable bubbler)	25	25 AWLR established. However, one site damaged during flash flood in distt. Kinnaur.
Bank Operated Cable way (BOC)	8	Established.
Site stores	17	Work completed.
Current meter (propeller)	8	Procurement completed.
Current meter (standard)	70	Procurement completed.
Current meter (pigmy)	24	Procurement completed.
Frame winch Bridge outfit	9	Procurement completed.
Discharge measuring weirs	1	Established..

The SW network was finalized for the State comprises of 42 existing gauge/discharge stations of various agencies and 35 new/existing defunct stations to be installed under HP-II. The stations and the type of installation were finalized after joint inspection with CWC officers.

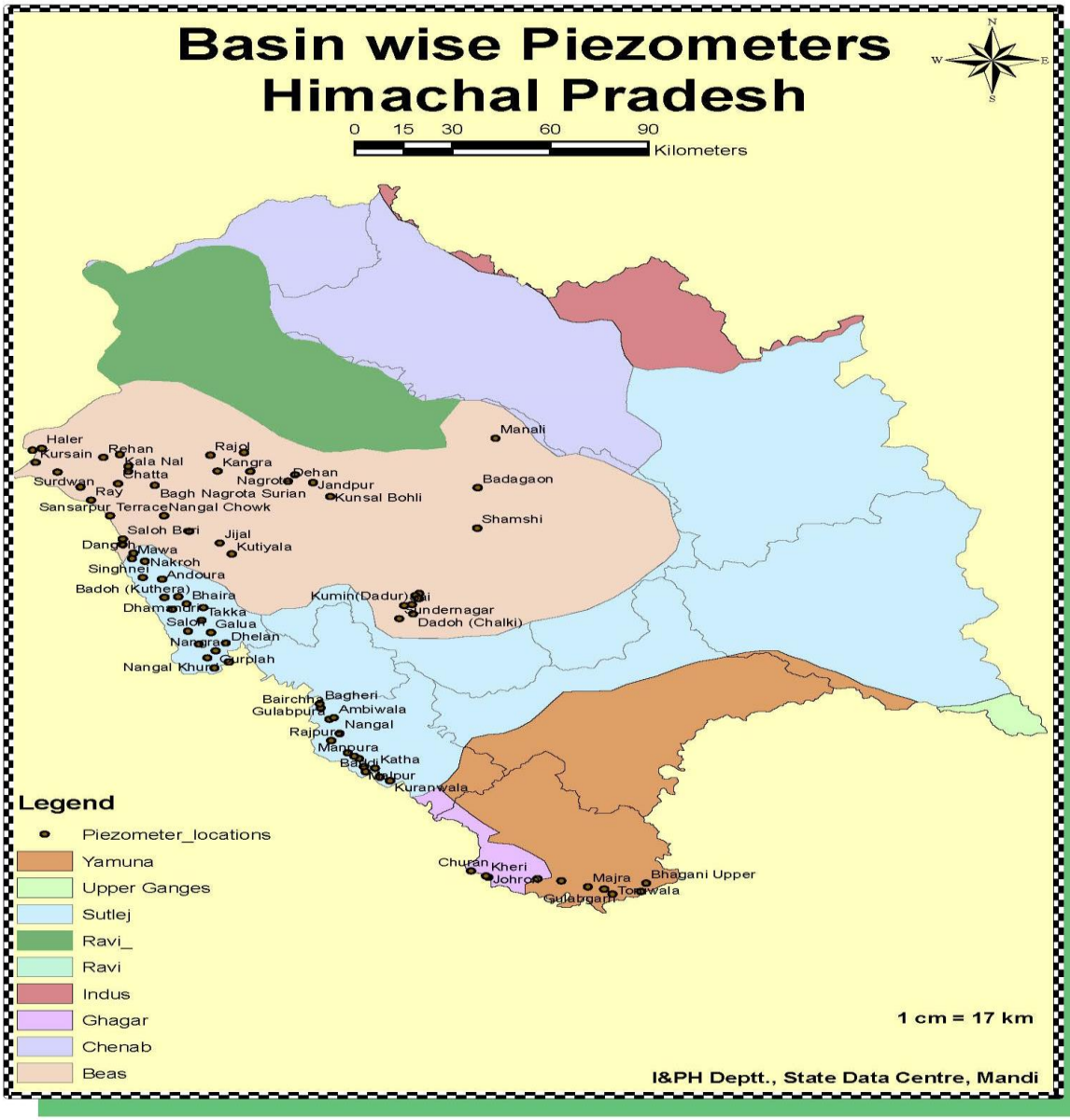
Due to non availability of field staff, data observation and collection of surface water site has been outsourced.

AWLR, Nauti khad, Shimla Distt.

Demonstration of BOC during Review Mission visit at Kullu (H.P.)

b. GW Observation Wells

Activities	**Provisions as per Revised Cost Tables 2013**	**Status**
Deep wells (cw) (piezometers borewells)	80	Established
Field equipment (Vehicle mounted Bore hole logger)	1	Procurement completed.
Protective Cover for DWLR (cw)		Work Completed.
Digital Water Level Recorders (DWLRs)	80	Established. DWLR data being received through telemetry / manual retrieval for 75 wells. Manual observation being made for balance 5 wells.
Submersible pump/GW Sampler pump	3	Procurement completed. Pumps being used for GW sampling.


Basin wise Piezometers
Himachal Pradesh
0 15 30 60 90
Kilometers
N
W
E
S
Haler
Kursain
Rehan
Kala Nal
Chatta
Surdwan
Ray
Sansarpur Terrace
Bagh
Rajol
Kangra
Nagrota Surian
Nangal Chowk
Dehan
Nagrota
Jandpur
Kunsal Bohli
Manali
Badagaon
Shamshi
Saloh Bari
Jijal
Kutiyala
Mawa
Nakroh
Andoura
Bhaira
Takka
Galua
Dhelan
Gurplah
Kumin(Dadur)
Dadoh (Chalki)
Bairchha
Bagheri
Gulabpura
Ambiwala
Nangal
Rajpura
Katha
Kuranwala
Churan
Kheri
Majra
Bhagani Upper
Legend
Piezometer_locations
Yamuna
Upper Ganges
Sutlej
Ravi_
Ravi
Indus
Ghagar
Chenab
Beas
1 cm = 17 km
I&PH Deptt., State Data Centre, Mandi

Data Retrievel from DWLR at Haroli

Data Retrievel from DWLR at Amb

There was a provision to install 70 piezometer bore wells in the state under GW component to assess the GW quality and quantity, which was subsequently revised to 80 in the Project Mid Term Review held in Oct.,09.
The GW data from 10 DWLR sites has started flowing in from Jan., 2010 and that from balance 70 DWLR sites has started from May.,2013 .

c. Hydrometrological sites

Activities	**Provisions as per Revised Cost Tables 2013**	**Status**
Standard Rain Gauge (SRG)	101	Established. Data being received from all stations.
Automatic RG (cw)(Automatic+ Ordinary)	85	13 Automatic RG (Tipping Bucket Type) and 22 Autographic RG installed and commissioned initially. 50 ARG with telemetry, approved by World Bank as additional activity in April, 2012 also established.
FCS new	4	Established. Data being received from Jan., 2011.
Weather station	4	Established.
Standard snow gauge	16	Established.

The hydrometorological network finalized for the state comprises of existing stations of various agencies and new stations to be installed under HP-II. It includes 189 Rain gauge (RG), 17 Fully Climatic Stations (FCS) and 45 Snow Gauges stations. 101 Standard Rain Gauges, 22 Autographic Rain Gauges, 13 Automatic (tipping bucket) RG, 6 FC (including 2 Automatic Weather Stations) and 16 Snow Gauge stations as new stations/replacement of existing defunct stations were part of this network.

As Himachal Pradesh had been performing consistently well among project IAs, World bank approved 2 additional AWS and 50 ARG with telemetry system in 2012 as Additional Hydrological Activities.


District wise Hydromet Network
Himachal Pradesh
N
0 20 40 80 120
Kilometers
J&K
J&K
Pangi
Udaipur
Danoon Sundla
CHAMBA
Banikhet
Dalhousie
Mehla
Kundi
Chowari
Gehra
Ghararu
Bharmour
Tikkri
LAHUL & SPITI
Holi
Bara Bhangal
Solang valley
Naddi
Manali
Dharamshala
Dashal
LUNJ
China
Tibet
Lari
KANGRA
Bir
Barot
Joginder Nagar
Khir Ganga
RANITAL
THURAL
Yangthang
Gaibung
Kuja Bahal
Kandi
Gadsa
KULLU
Punjab
Kataula Nr SDC
Tinder Larji
Panjain
Spillo
Mattansidh(IPH store)
Barchwaad
Sarkaghat
Banjar
Kafnu
HAMIRPUR
MANDI
Bijahai
Nichar
Sarahan
Kilba
KINNAUR
UNA
Langata
Jai Devi
Nugalsari
Pangi (R/Peo)
Baldawara
Shikari Devi
Jaujheli
Cholu Thach
Sunhani
Baragaon
Panjgain
BILASPUR
Khadrala
Himmri
Marotan
Shillaru
Rohru
Swarghat
Dodra kawar
SHIMLA
Karyali
Bhiajji
Kharapathar
Kotkhai
Gumma
Nalagarh
SOLAN
Junga
Uttarakhand
Churdhar
Rajgarh (Shalana)
Haripur Dhar
Haryana
SIRMAUR
Main Thapal
Kala Amb
Legend
FCS_AWS
Autographic_RG
ARG_TBR
SRG_standalone
Snow_gauges
1 cm = 21 km
HP IPH, SDC, Mandi

Fully Climatic Station at Distt Kinnaur

Automatic Rain Gauge at Distt. Kullu

Because of the paucity of the field staff for recording the observations, data observation, collection, and reporting job was outsourced after taking approval of the State Level Hydrological Information System Steering Committee (SLHISSC) and clearance from the World Bank.

The entry of hydro meteorological data received from the Department of Land Record for the year 1961-1963, 1966-1968, 1971-1977, 1978-1979, 1990-1994 and 1995 to 2009 has been entered in Surface Water data Entry System (SWDES) software. Data for the period 1980 to 2007 is being entered. Further, the current rainfall data collected from IMD for the period June, 2008 to October, 2010 and June, 2012 to March, 2013 has also been entered in the SWDES software. Meteorological data observed under HP-II is being received on fortnightly basis in the Hydrology Cell since Nov.,2010 and entered in soft form. Part data has been sent to IMD, Pune for validation.

d. Water quality laboratories

Activities	**Provisions as per Revised Cost Tables 2013**	**Status**
Level 1 lab buildings	6	Established at Baijnath, Rampur, Nohradhar, Nagrota Suriyan, Karsog and Banjar.
Level 2 lab buildings	2	Established at Mandi and Dharamshala.
CW Level 2+ lab building	1	Established at Shimla.
Water Quality Kits	15	Procured.
Level 1 lab equipment	12	Procured. 6 labs already functional under IPH Divisions.
Level 2 lab equipment	2	Procured. Labs are functional at Mandi & Dharamsala. Additional equipments had also been procured.
Level 2+ lab equipment	1	Procurement completed except that of AAS tender could not be finalized in time despite recall twice. Additional equipments had also been procured.

Level II Lab at Dharmshala

Level II Lab at Mandi

Under this component there was a provision of setting up of 1 level II+, 2 level II and 12 level I water quality labs. Besides the laboratory equipment for these labs, new buildings for 1 level II+, 2 level II and 6 level I labs was also been approved. Operation of 2 Level II labs and 5 level I labs has been outsourced.

2. III. B. Upgrading of data processing and management system

a. Data Centre buildings

	Provisions as per Revised Cost Tables 2013	**Status**
State - Data Center	1	Establishd at Mandi.
Divisional office Data centre buildings(including GWO Una office)	4	Established at GWO, Una, DDC, Nurpur, DDC, Palampur and DDC, Shimla.
Sub-Divisional Office Data centre buildings	12	Established at Kandaghat, Nalagarh, Dharampur, Gumma, Una-II, Gagret, Nagrota Surian, Nohradhar, FP Amb, Padhar, Banikhet and Kanaid

State Data Center, Mandi

Inside View of State Data center, Mandi

Divisional Data Center, Shimla

Divisional Data Center, Shimla

Sub-divisional Data Center, Amb, Una

The data center network includes State Data Centre (SDC) at Mandi, 8 Divisional Data Centers (DDC) and 40 Sub divisional Data Centers (SDDC). It also includes provision for construction of 1 SDC, 4 DDC (including 1 GWO Una) and 12 SDDC buildings. Construction of 42 Section Offices to support DDC/SDDC has also been approved under the project.

b. Data management computer package SW+GW

HP-II enabled the State to enhance its existing hardware and software infrastructure for better execution of the project. Under this project various types of hardware had been procured, which mainly included PCs, Laptops, Servers, Printers both (Colour and B/W), Photocopiers, LEDs, Multimedia Projectors, Scanners, Plotters, portable hard drives, audio system etc.

Various Specialized Software procured under the project are, GIS software, ERDAS Imagine Software, WaterGEMS etc. The detail of various hardware and software procured under this project is as under:

Activities	**Provisions as per Revised Cost Tables 2013**	**Status**
State Data processing package.	1	Procured
State Data storage package.	1	Procured
GIS software	1	Procured. (Arc info, arc editor, arc view, spatial analyst extension, 3D analyst extension)
GIS data set	1	Procured (54 nos. OSM digital sheets and AOI based standard digital data covering approximately 56,000 sq.km. of IRS-P6 - LISS IV, AOI based stereo orthokit data covering approximately 55,673 sq km covering the geographical area of Himachal Pradesh and 16 digital survey sheets.
Other computer package		Procured (10 Laptops, 10 External hard disks, 10 Printer and 10 Antivirus)

Data storage centre hardware and software	1	Procured (Server room Hardware for SDC, Mandi, Racks, Switches, LAN and Scanner)
Sub divisional package	40	Procured
Divisional package	8	Procured (8 packages of 2 PC, 1 Laser printer (B/W), 1 Laser printer (color), 1 Multi functional devise,2 UPC, 1 Laptop, 1 LAN, 1 EHD and 1 Photocopier & Furnishing of SDC, Mandi, GWO, Una (including furnishing for Sub-divn., Santokhgarh, DDC, Nurpur and DDC, Palampur, 20 External Hard disks. Besides, specialized softwares such as ERDAS Imaging and WaterGEMS has also been procured under this activity.

The computer hardware packages for SDC, 40 SDDC and 8 DDC was procured in consultation with Project Coordination Secretariat/ Technical & Management Consultant (TAMC). A Project Coordination Secretariat/ Technical & Management Consultant (TAMC) assisted the State in finalizing the IT system architecture for the State Data Centre, DDCs and SDDCs. Procurement of Server room Hardware for SDC, Mandi was made as per the recommendation made by TAMC expert.

c. Communication facilities

Activities	**Provisions as per Revised Cost Tables 2013**	**Status**
Communication facilities	35	Telemetry system for 35 sites (20 AWLRs, 13 ARG and 2 AWS) has been procured and installed on all sites.
NICNET linkage within zone	1	2 Mbps Internet leased line from BSNL has been procured through Direct Contracting after getting approval from World Bank.

3 III. C. Purpose Driven Studies (PDS) :

The following three PDS topics were got approved by Central Screening Committee:

1. Impact of Sewerage Effluent on Drinking Water Sources of Shimla City & Suggesting Ameliorative Measures.
2. Study of Impact of River / Khad Bed Mining On Water Sources (Water Winning Structures) & Evolution of Policy & Guidelines To Prevent Adverse Impact.
3. Study on Ground Water Quality Characteristic In Industrial Predominant Areas Of H.P.

The study of *"Impact of Sewerage Effluent on Drinking Water Sources of Shimla City & Suggesting Ameliorative Measures"* was carried out by NIH, Roorkee under their component. The final report was received in May, 2013 which was accepted by Expert Group and IPH Deptt. has initiated action on its recommendation.

For *"Study of Ground Water Quality Characteristic in Industrial Predominant Areas Of H.P"* consultancy services were awarded to PEC University of Technology, Chandigarh. The study has been completed and approved by HISMG-Tech (PDS) in its meeting held in May, 2014.

Agreement has been signed with Head, Department of Hydrology, IIT, Roorkee for after receiving World's Bank No Objection for engaging them as consultant for *"Study of Impact of River / Khad Bed Mining On Water Sources (Water Winning Structures) & Evolution of Policy & Guidelines To Prevent Adverse Impact".* The final report has been received and sent to PCS for acceptance.

PDS review meeting held at Department of Hydrology, IIT, Roorkee.

Training Component:

Project provided an excellent opportunity for the IA and other Stakeholder departments to train their personnel and expose them to latest techniques and sound practices of hydrological data observation, collection, processing and storage etc. Initiatives were taken by the State IA and around 650 officers/ officials were deputed for various trainings under Hydrology Project-II. Besides nominating candidates for training organized by institutes like IMD, CWC, CPCB, ASCI, ESRI, NWA, ESCI, NIH etc., State IA took initiative to organize training for larger batches at Himachal Institute for Public Administration, Shimla and State Department Training Institute at Mandi. These trainings were organized with assistance of organizations like NIH, CWC and IMD. 18 in-house trainings were organized by State IA. Some of the training organized are as under:

- Courses on Water Quality organized in collaboration with NIH, Roorkee at HIPA.
- Programs on computer skill regarding data handling over internet organized at HIPA.
- Courses on GIS organized at HIPA.
- Courses on SWDES organized in collaboration with NIH, Roorkee at HIPA.
- Course on Method of Measurement of Discharge on the G&D stations over rivers organized with CWC at HIPA and IPH Training Centre, Mandi.
- Course on Hydromet Observer's organized in collaboration with IMD at HIPA.

Experiences and Lesson Learnt

Experience acquired during the 8 years of project implementation and appreciation of State IAs performance by World Bank and PCS has inculcated confidence in the organization to take such type of project in future, as well. Besides, positive team work and continuity of Key officers made this project a great successful in the State.

Future plans

- Himachal Pradesh I &PH Deptt. was the nodal agency for implementation of HP-II. Post project HIS network established under the project would be sustained through maintenance funds to be made available by the Govt. under other relevant budget heads.
- Most of the important equipments, being under warranty or post warranty AMC, there is no immediate danger of system getting out of order.
- Department also looks forward towards phase III of the project for building up on the data that would be generated through the HIS network. It would also open the doors for continued technical support and guidance of expert agencies for making the network a robust system.