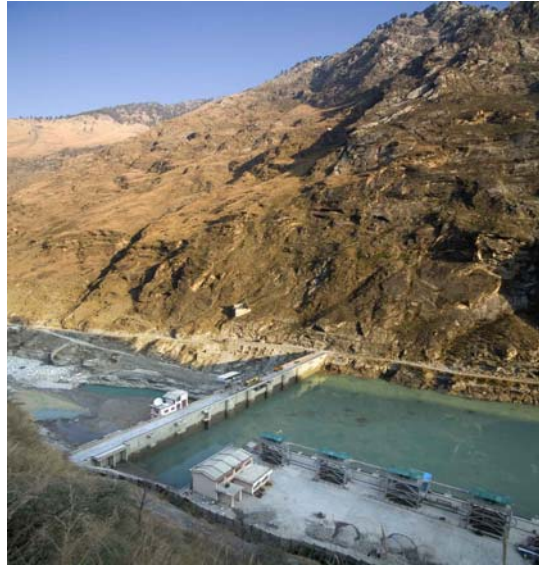


Hydrology Project Phase-II

Ministry of Water Resources, Government of India has initiated Hydrology Project Phase-II (HP-II) with the help of the World Bank. Agreement for the Hydrology Phase-II between International Bank of Reconstruction and Development (IBRD) and Government of India was signed on 19.01.2006. The project has become effective from 5th April 2006. The duration of the project is six years and likely to close by 30.06.2012.



Objectives

The objectives of the project are to extend and promote the sustained and effective use of Hydrological Information System (HIS) by all potential users concerned with water resources planning and management, both in public and private sectors, thereby contributing to improved productivity and cost effectiveness of water related investments.

The project is being implemented in 13 States and eight central agencies including Bhakra Beas Management Board (BBMB). The following States & Central Agencies are participating in the project:

States – Andhra Pradesh, Gujarat, Karnataka, Kerala, Madhya Pradesh, Chattisgarh, Maharashtra, Orissa, & Tamilnadu (States in HP-I) and Punjab, Himachal Pradesh, Goa & Pondicherry (New States)

Central Agencies – MoWR, CWC, CGWB, CP&WRS, NIH & IMD (in HP-I) and BBMB & CPCB (New Agencies)

Under the project, **Real-Time Decision Support System (RT-DSS)** is proposed on a pilot basis for the Satluj and Beas basins for real-time operational management of reservoirs. BBMB has proposed a development of Real-Time Decision Support System (RT-DSS) strengthened with sophisticated Data Acquisition System for operational management of reservoirs of BBMB.

Real Time Decision Support System (RT-DSS) Features

DATA ACQUISITION SYSTEM

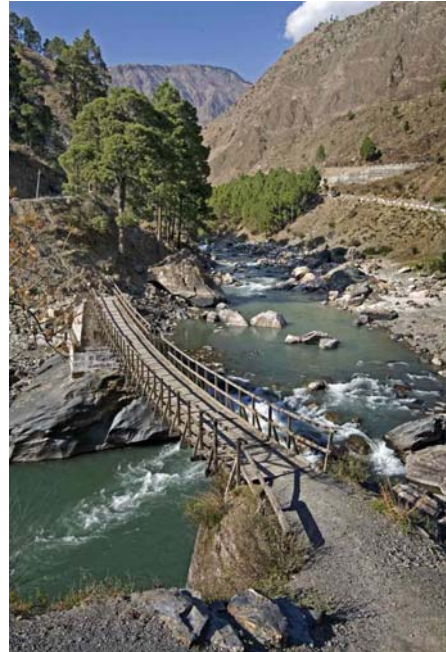
- Improved state-of-the-art real time data collection

ANALYSIS AND MODELLING

- Improved precipitation, snowmelt, runoff and inflow forecasts

DECISION SUPPORT SYSTEM

- Improved reservoir operation, hydropower generation and water supply



The objective for the development of RT-DSS for operational management of its reservoirs is to support operational decisions well in advance for long term planning and also at shorter time intervals. Such decisions will relate to the scheduling of reservoir releases and running hydropower turbines, the operation of spillway gates, the issuance of flood warnings, and the deployment of area evacuation measures by Administrative authorities. RT-DSS will provide top management with a well structured, user friendly, practical and complete water resources management information system that will assist the decision-makers in taking the right decisions on the basis of good comparison of different strategies under various scenarios. RT-DSS will be quite useful for priority ranking in master planning. It will provide necessary data & reports at the desired intervals, which will facilitate integrated reservoirs operation decisions from time to time and at short intervals for optimum utilization of water. Real time DSS will be useful for issuing advance flood warning for preparation of evacuation plan to eliminate/minimize the loss of lives and properties. It will also facilitate the management to assess the consequences of a set of choices at faster rate, which are direct function of time. It will also improve quality of decision through increased consistency.

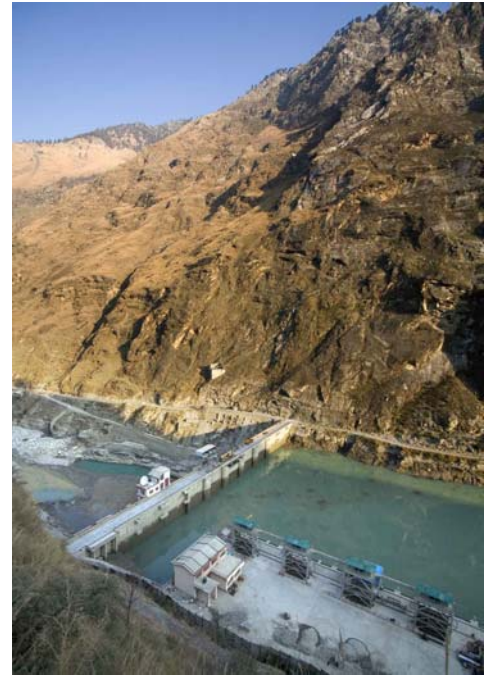
Services and Benefits

Services

- Real time short term forecasts
- Real time long term forecasts
- Support decision making for optimal performance

Benefits

- Minimum loss and spill of water
- Maximum economic value of water
- Optimal solutions for dam operators that balance short term and long term objectives



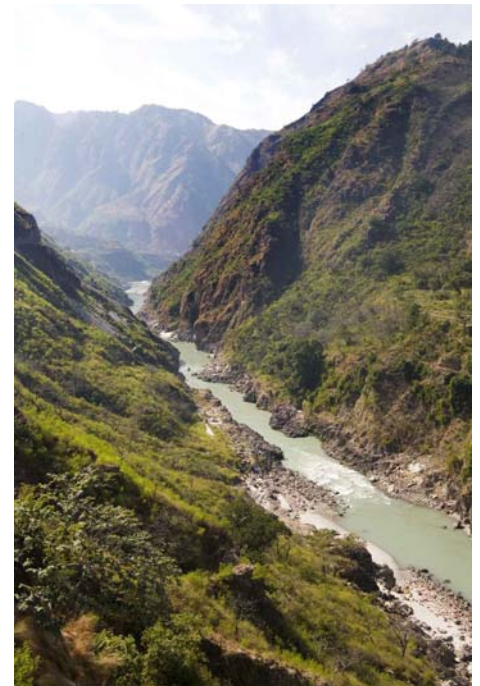
Decision Support System Basic Tools

Decision Support System built upon state-of-the-art well proven industry standard modelling tools:

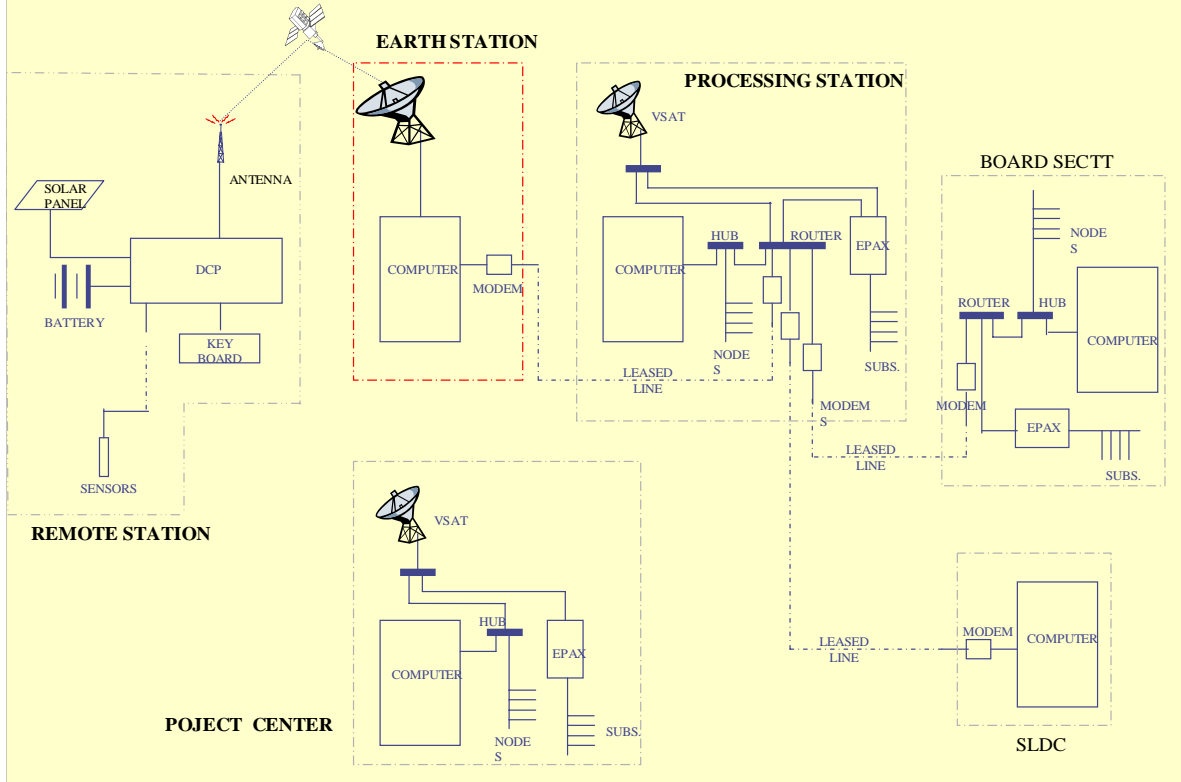
- GIS based hydrologic information system
- Precipitation-runoff and hydrodynamic modelling
- Water resources management model – long term forecasts, water allocation, reservoir operation

Unique features of the tools required for RT DSS:

- Real time data assimilation
- Forecasting
- Optimisation

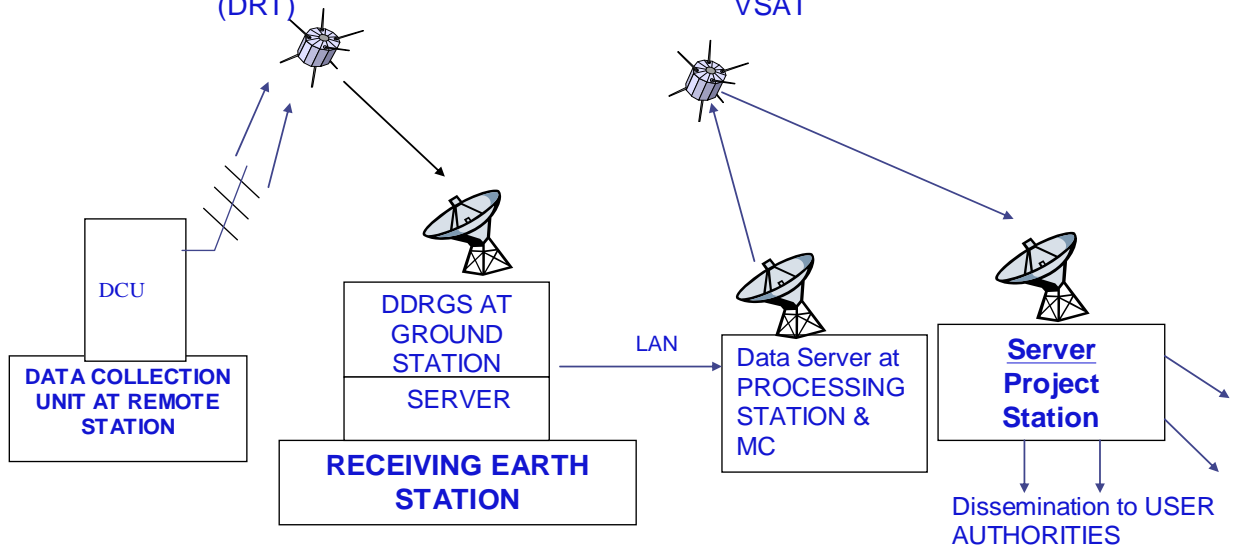


BLOCK SCHEMATIC



INSAT/KALPANA-I
Data Relay Transponder
(DRT)

SATELLITE
Commercial Transponder
VSAT



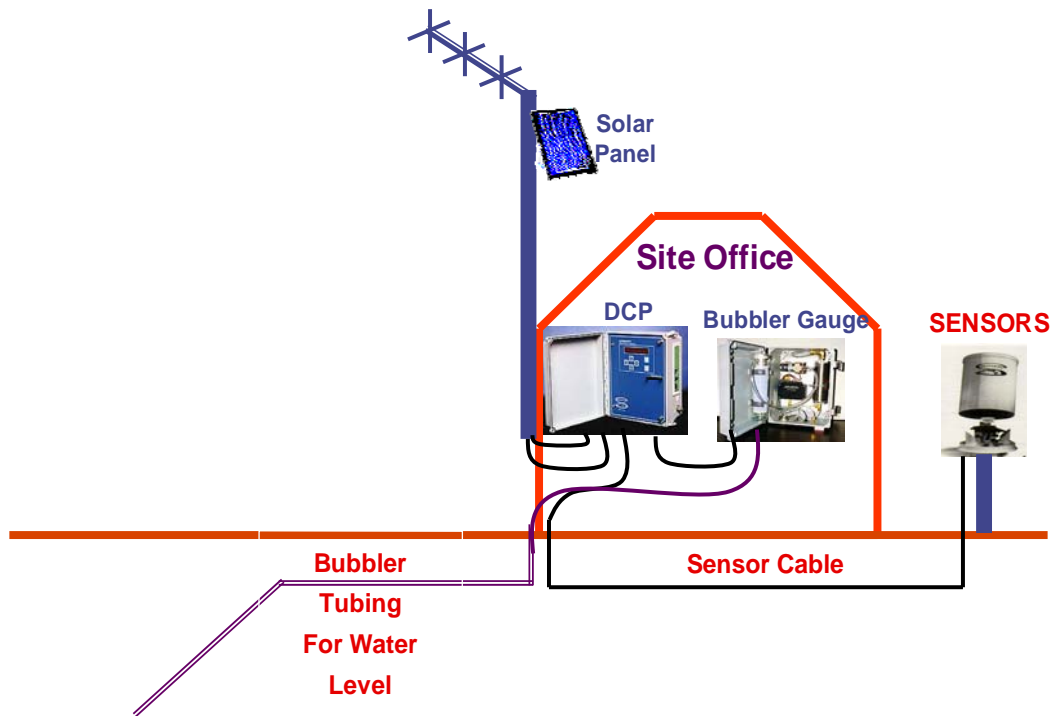
Abbreviations

DCU
MC

Data Collection Units DDRGS Digital Direct Receiving Ground Station
Modeling Center.

INSAT BASED DATA TRANSMISSION SYSTEM

TELEMERY BASED AUTOMATIC WEATHER STATION



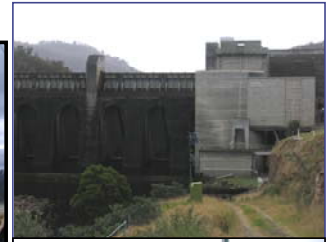
Monitoring & Acquisition Systems

- **Electronic Sensors**
 - Reservoir level
 - Rainfall
 - Water Quality
 - Evaporation
 - Atmospheric Pressure, Temp.
 - Weather stations
- **Data Loggers**
- **Telemetry**
 - Combined solutions radio/satellite/phones
 - SCADA



Parameters at Meteorological Sites

- Water Level
- Air Temp.
- Water Temp.
- Rainfall
- Humidity
- Solar Radiation
- Wind Direction
- Wind Speed
- Channel Level
- Conductivity
- Turbidity
- Ph Field
- Forecast Natural Flow
- Voltage - Equipment
- Dissolved Oxygen



All parameters are telemetered via short radio link, GPS, CDMA, Satellite, SCADA