

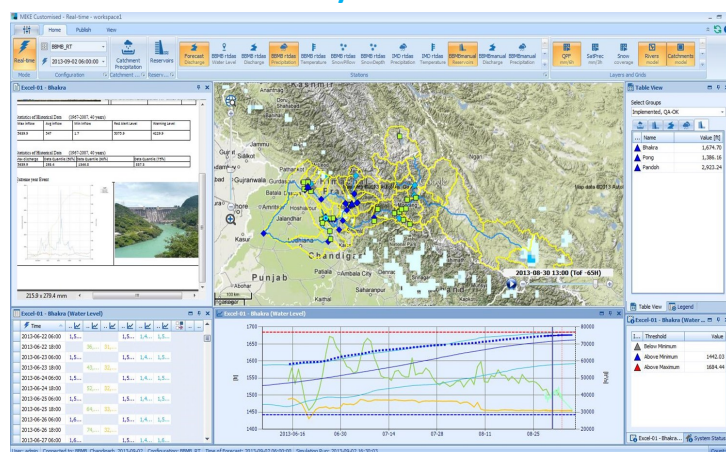


INNOVATIVE REAL TIME DECISION SUPPORT SYSTEM FOR WATER RESOURCES and FLOOD MANAGEMENT IN INDIA

Hydrology Project II

As part of the Bank Assisted Hydrology Project II, Real Time Decisions Support Systems (RT-DSS) have been developed and implemented in Bakra Bias Basin (Punjab, HP) and Krishna-Bhima Basin (Maharashtra). Real Time Hydro-Met data acquisition network implemented under this project provides key data required for forecasting Inflows into the reservoirs and forms the basis for reservoir operation decision making and providing flood early warnings to communities. State of the art hydrological and hydrodynamic models developed under this project is the core of the RT-DSS. The systems have been tested during 2013 monsoon and will be operational by local officials.

RTDSS for Bhakra Beas System



The Bhakra Dam, which celebrated its Golden Jubilee on October 22, 2013, together with integrated reservoirs and water distribution system caters the need of energy and water to the northern states, particularly to HP, Haryana, Punjab and Rajasthan.



The Bhakra and Beas reservoirs have a combined catchment area of nearly 70,000 km². The Bhakra reservoir alone meets the irrigation needs of over 40,000 sq. km. Three states in the region – Punjab, Rajasthan, and Haryana suffer from floods during the monsoon resulting into loss of lives and damage to property, crops and infrastructure. During the dry season, this area often struggles with droughts due to long periods of water shortages.

Normally, the reservoirs are filled during the monsoon period, with the stored water utilised during the non-monsoon period. However, during the years when the monsoons start early, the reservoirs may fill sooner than expected, resulting in little additional space for late monsoon rainfall. If there is heavy rainfall after the reservoirs are full, the flood gates must be opened which causes downstream flooding. To avoid this, water is released earlier, often wasting valuable water. The main reasons behind this challenge has been a lack of a real time inflow forecasting to the reservoirs and a lack of decision making tools for efficiently operating reservoirs.

In order to overcome the problem BBMB requested the World Bank's assistance in developing and implementing a Real Time Decision Support System (RTDSS) that would enable them achieve improved reservoir operation for optimal water resources management while minimizing flood risks.

A Real time Data Acquisition System (RTDAS) consisting of a telemetry network of rainfall & snow in the catchments and water levels along rivers, reservoirs and canals has been installed to provide inputs to the RTDSS. RTDSS provides up-to-date, easily understandable information on the state of water resources and based on forecasts and helps the decision makers in taking appropriate decisions efficiently.



Bhakra Beas Management Board

An ISO 9001,14001 Certified Board

About Us

RTDSS

IMD

Manual Data

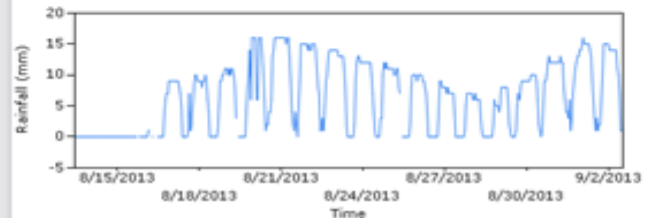
Rainfall



BAHLI

Time	Value
26/08-2013 11:30:00	0
26/08-2013 12:30:00	0
26/08-2013 13:30:00	0
26/08-2013 14:30:00	0
26/08-2013 15:30:00	0
26/08-2013 16:30:00	0

Start 09-09-2013 26
End 16-09-2013 26



The RTDSS is based on a state of the art integrated modelling system centred around MIKE CUSTOMIZED supported by a suite of hydrological, hydrodynamic and water accounting modules of the MIKE family developed by DHI, the project consultant supporting BBMB. RTDSS processes the data and provides decision makers with easily understandable information on the state of their water resources. In addition, RTDSS real time flood forecast modelling system gives BBMB the information needed to issue flood warnings, allowing downstream authorities and communities to prepare against floods so that flood damages can be minimized.

MULTIPLE BENEFITS

Since the rivers under BBMB's management flow through more than one state, there are multiple stakeholders concerned with how the water is used. In Punjab, Haryana and Rajasthan, for example, there are often disagreements about the amount of water they receive. To help solve this issue, the RTDSS keeps track of water allocated to each state on selected time steps (daily, weekly). Using automatic sensors installed in canals in the region, the RTDSS software monitors the flow of water going to each state. It also helps Punjab, Rajasthan and Haryana meet their irrigation

needs by optimising reservoir operations. It can also help authorities optimize power generation, encouraging overall development in the region. The RTDSS enables BBMB to improve flood management by providing early warning to communities who will be prepared to save lives and minimize loss property.



Automatic Precipitation Gauge Installed at Kalpa, (Elevation 2758 m)

