

## Contribution of the Hydrology Project: Information for future Management

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**Abstract:** The Hydrology Project Phase II – partly funded through a World Bank loan – is targeted at improving the availability of “good” hydrological data in the 13 States of India in which it is active – including Punjab. Good management of the water resources of Punjab demands good knowledge of the hydrological processes, and a clear understanding of the nature and possible severity of dry and wet periods. This requires strengthening of the information data-base in order to extend any scientific investigations made in parts of the region into a full understanding of how the complete region behaves, and so how resources can be developed or managed to maximise the benefit for all. The importance of good spatial data with long (and representative) time series cannot be under-estimated for this work. This is what we are seeking to lay the foundations for. In addition to the tasks of data collection and validation, we are also looking to develop more advanced data products to assist users, where value is added to the basic data by presenting expert evaluation of the data as well. In the past this has been sometimes done through analysis in Yearbooks, and we hope to develop this type of approach for the electronic data released as well.

**Keywords:** Hydrometry, data management, quality assurance, data dissemination, data use

### INTRODUCTION

The Hydrology Project is a World Bank project to help improve hydrological data and access to hydrological data (World Bank, 2004). The project began in the 1990s, and is now on Phase 2 where the original 9 States of peninsula India have been joined by the States of Punjab, Himachal Pradesh, Goa and Pondicherry. For Phase 2 the Bhakra Beas Management Board has also joined as one of the central project partners. The project is being managed by the Ministry of Water Resources through a Project Coordination Secretariat (PCS). More recent data on what is being implemented through the project is available through the project Mid Term Review Report (PCS, 2009) available for download through the project web-site (<http://hydrology-project.gov.in/>). Mott MacDonald are leading a consortium of consulting engineering organisations to provide technical assistance to PCS – the Technical Assistance and Management Consultancy (TAMC).

Our work on the hydrology project in Phase 2 is placing emphasis on improving access to information. One study carried out within the project recently has found that despite the considerable investments made by Phase 1 activities, key potential users of hydrological data (scientists and researchers, environmental scientists, ecologists, engineers) had very little knowledge about how to obtain hydrological data, and believed that access was very difficult and time-consuming. This must change if water management is to improve within India – and so facilitating the change is a high priority for the project. Naturally there are factors external to the project that also restrict what can be achieved in this direction, but efforts must be made to improve the present position.

### VALUE OF HYDROLOGICAL DATA

There is little need to explain to those using hydrological data the absolute importance of maintaining a good network of measuring locations where a long time series of:

- accurately recorded
- reliably collected
- representative measurements

are maintained with data carefully compiled, checked and summarised and made readily available to any users requiring such information. Such data are fundamental to:

- accurate and efficient design of water resources development projects, flood protection works
- effective management of such projects
- understanding hydrological processes in a way that allows interpolation and extrapolation of observed behaviour to allow estimation of how development or management of the water cycle will change in future
- effective environmental management
- issues such as how to manage climate change.

It is also recognised that in India there is little budgetary provision for collection of hydrological data – and proper maintenance of records of historic measurements. There seems to be a lack of recognition that the skills involved in maintaining and developing a good hydrological data-base are specific and not something that any civil engineer might understand in the course of a career in government service.

The Hydrology Project has a number of elements that seek to promote the knowledge of the value of hydrological data, and how it can be obtained. While this work encompasses contact with rural populations (to improve understanding of how their actions might impact on availability and quality of groundwater in the future, for example) I feel greater efforts also need to be made to explain to administrators why budgetary support and development of hydrological data systems must be prioritised as a vital investment for the future – how in ten years time is the sophisticated management of water resources that will be absolutely essential for India be achieved without

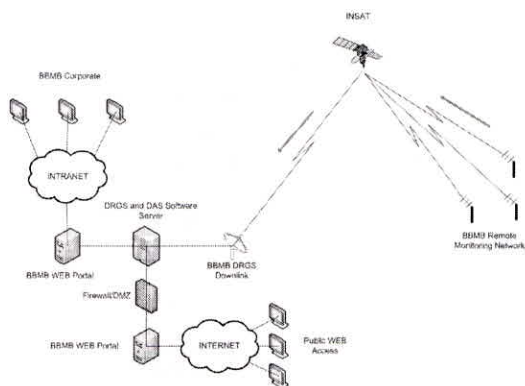
an additional ten years of accurate, reliable and representative data collected from existing networks – along with the understanding delivered by good scientific investigations using the improved hydrological data to support it.

### **SPECIFIC HYDROLOGY PROJECT INITIATIVES**

Work that the Hydrology Project is currently undertaking includes:

- development of a systematic monitoring network for rainfall, climate, river flow and groundwater levels and quality within Punjab, integrating State monitoring networks with those of the Central Water Commission, the Central Groundwater Board, and the India Meteorological Department.
- Provision of new technology in the form of Acoustic Doppler Current Profilers for integrated measurement of river flow at key locations
- Improved software systems and hardware for electronic data storage, together with software for checking and validating data to improve its reliability
- Training of hydrology staff in a wide range of areas in a coordinated programme to improve availability of key skills needed for effective management of data collection and processing.
- Work to improve equipment in water quality analysis laboratories, and comprehensive training programmes for staff to improve laboratory practices to improve reliability of water quality data

In addition, a key development is support for a real time flow forecasting system for the BBMB, with a decision support system to improve management of the reservoirs and systems of the BBMB with an extensive real time data collection system to provide information to the DSS for active guidance of system operation. This is shown diagrammatically in Figure 1.



**Fig. 1 :** The BBMB Real Time System

Another area of development being sponsored by the project is in the provision of “hydrological design aids” for surface water projects. These tools are being developed to maximise effective use of hydrological data in the design of water resources projects by offering ways of estimating:

- Water resources assessment
- Flood characteristics
- Sedimentation estimates

at any location in India, using state-of-the-art practices.

Training needs for the project have been developed from an assessment of the skills needed within hydrometric organisations, and using assessments of skill gaps to identify courses required, and potential course providers. In this way an extensive training programme has been developed, including:

- Within India short courses provided through the National Water Academy, National Institute of Hydrology, Central Groundwater Board and Central Pollution Control Board (and others)
- International short courses for subject areas where additional knowledge was judged to be needed

- International Study tours to provide exposure to international practices to key staff
- Internal study tours to improve learning through interaction between organisations within India

## ENGAGEMENT WITH DATA USERS

Perhaps the key challenge within the project is to effectively engage with potential users of hydrological data in order to:

- Make sure the data being collected, and the data summaries being prepared are those that the users would find useful, and
- To explain to users how data can be obtained,
- Improve advice given by data centre staff to data users. The aim is to provide a level of customer service whereby the specialist knowledge of the data centre staff is available to those requesting data to make sure the data-sets provided are the most appropriate, and comprehensive for the task the data is needed for.

The issue of production of data summaries is at the early stages – but is really an extension of the old yearbook approaches. The making of monthly average data freely available, or such products as “percent of normal rainfall” maps are the sort of things that might be made available through project web-sites. All participating agencies are encouraged to create web-sites (see, for example <http://hydrology-project.gov.in/> and links from that web-site). An initiative is also to make “real time” data available through web-sites: yesterday’s rainfall from key raingauges; information on reservoir water levels or key groundwater levels for example. One potential application of such data could be developed for providing key guidance for farmers (selection of crops or sown areas based on end-of-monsoon conditions, for example).

The Hydrology Project does have a system for Hydrological Data Users Group (HDUG) for

engagement with data users. In practice, such groups are mostly formed from government Department officers, and so have limited impact. Ways of encouraging other groups to interact with the project through the HDUG are being examined.

### **CONCLUDING REMARKS**

In the Hydrology Project, the ultimate aim is to make appropriate hydrological data available (and easily accessible) to data users. For water management in Punjab this is enormously important, and will underpin all future work to more effectively and efficiently manage the water resource problems in the State. In addition, key tools to help analysis using such data are being developed. This will be a continually evolving process, but a key area for improvement is to build

better links between the data collection agencies and the data users. While most of the onus for this process rests with government Agencies, the data user community is also urged to proactively interact with collectors of data to help drive these processes, and to provide constructive feedback for efforts to improve these services.

### **REFERENCES**

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