



HMIS Project in Sri Lanka

Automatic Water and Weather data monitoring with two independent telecommunication means working in parallel



Background

There is a very long tradition of building dams and monitoring water resources in Sri Lanka. Early reservoirs are dating back more than 2000 years.

The existing system needed to be upgraded and extended. In combination with a modern state-of-the-art technical system solution, capacity building of personnel was necessary. The provided system solution was meant to operate very reliably under harsh tropical conditions (daily temperatures of more than 30°C and relative humidity up to 100%). The monthly average rainfall is up to 500 mm.

The operating network to be provided should work fully automated and provide the data in real time to its corresponding data centre at the Hydrologic Division head-quarter in Colombo.

The network is spread over the whole of the island (approximately 66,000 km²).

Task

The contract was signed between OTT Hydromet GmbH as Contractor and the Ministry of Irrigation and Water Resources as Employer.

The Supply and Installation of a Hydro-Meteorological Information System for Sri Lanka includes the following components:

- Establishment and upgrading of 122 hydro-meteorological stations.
- Establishment of a central database system for automatic data acquisition, processing, archiving and dissemination for hydro-meteorological data and information
- Provision of flood forecasting and reservoir management tools and support to implement decision support tools. This incorporates an introductory training in water flow modelling.
- Improvement of the analytical capability of local staff by capacity building
- Establishing procedures, providing tools and training for real time analysis of flood situations

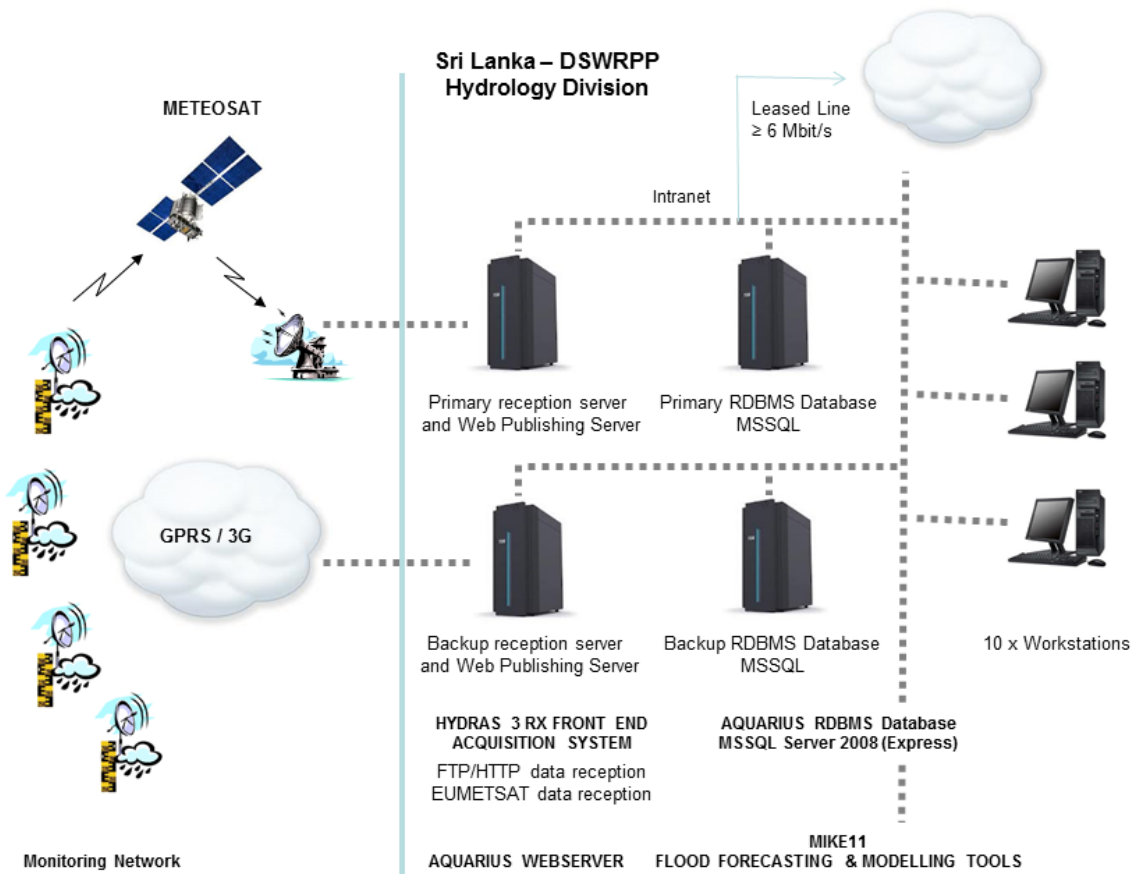
Solution

- OTT collaborated with several partners: Analytical Instruments Pvt. Ltd. (AIPL) as local partner for Civil engineering, installation, commissioning and maintenance; Danish Hydraulic Institute (DHI) as expert for hydrological forecasting and Aquatic Informatics Inc. for water data management
- The whole **Project Management (lead)** was provided by OTT Hydromet as contractor. OTT prepared a comprehensive Inception report which has been reviewed several times by the customer and implementation consultants. Based on its final version a project schedule was created.
- The selection of technology and instrumentation and the design of each station were based on facts gained by a joined site survey. Decision criteria were amongst others: hydraulic conditions, suitability of sensor technology, availability of telecommunication means and high benefit from gathered data. After design approval production and civil works started. Direct instrumentation was installed and commissioned at each particular site. The data centre was set in operation in parallel to the field stations.
- Station setup followed the data flow principle “sensor – data logger – telecommunication equipment”. The stations have been completed by solar power, overvoltage and vandalism protection.
The following sensors are in use:
 - Level: OTT PLS and OTT RLS
 - Velocity: OTT SLD
 - Wind: Lufft WS Series
 - Radiation: NRLite 2
 - Air temperature and humidity: OTT TRH
 - Precipitation: OTT Pluvio²
- **Smart power management** of the station enables usage of solar power with just a 20 Watt panel. The backup batteries guarantee up to 30 days of autonomous operation.
- The **OTT net DL 1000** data logger controls the data sampling and telecommunication scheme. Two independent methods of data communication are implemented: IP based communication via GPRS and data transmission using the Meteosat satellite system. Transmissions take place on an hourly basis for each method. This means that in general data received in the data centre are not older than 30 minutes. The telecommunication redundancy concept guarantees extremely high data availability. GPRS communication is realised by the internal modem of the OTT netDL1000, the satellite communication takes place through the OTT HDR M3 satellite transmitter.

- The **Data centre** has been implemented from scratch. Servers, routers, switches and uninterruptible power supply (UPS) form the hardware base on the server's side. Desktops and printers complete the working system. An A/C system and a self-triggering diesel generator guarantee the operation of the data centre under adverse conditions. OTT Hydras3RX and Meteosat receiver software are used for data reception and plausibility checks. An SQL data base stores data and makes them available for Aquarius Time-Series and WebPortal software as means of data management and publishing. Hydraulic modelling based on Mike 11 software uses the data base as well.
- **Capacity building** played a major role. The training was provided as on the job and as formal training sessions. It ranged from training for operators to field service engineers and hydraulic data analysts through to executives. The general course overview was given in the Inception Report. Part of the training for executives was an exchange of experiences at the Inn-Danube flood forecasting centre in Augsburg, Germany.



- A **Quality assurance** regime was set up over the whole span of implementing the project. Major project steps were documented by a web based data management software to ensure transparency for participating parties. Standardised designs and protocols were in use, but needed to be adapted on a site-by-site basis. Technical interchange meetings were held regularly to ensure good communication and discuss open items.
- **Maintenance** is important while and after commissioning. Although the equipment does not need calibration and the smart design leads to self-contained stations, there is a need for maintenance. The strong growing flora, high sediment loads, disturbance from wild animals and flood damages call for basic regular maintenance.



Data acquisition, processing, archiving and web based dissemination with back up // analytical tools, hydrological assessment and forecast models with backup



Advantages

- Interconnected, well balanced state-of-the-art system
- Hydrological and meteorological data from all over the island is concentrated in one data centre
- System design delivers data in a compact form, so data can be used as decision support.
- Open system architecture supports further extensions of the network.
- Reliable real time data by means of parallel telecommunication transmissions
- IP-based communication of the network allows using a network management software
- The system provides the ability to automatically send generated alerts to defined groups of persons
- Low operational cost (e.g. Meteosat use is free of charge) by self-contained station design

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