Vietnam

Capital city: Hanoi
Inhabitants: 95.5 Million

INSTITUTIONAL SETTING AND PURPOSE

The Ministry of Natural Resources and Environment (MONRE) performs the function of state management in the fields of land, water resources, mineral resources and geology; environment, meteorology and hydrology; climate change surveying and mapping, integrated management of natural resources, and protection of sea and island environment. As a part of MONRE, the National Centre for Water Resources Planning and Investigation (NAWAPI) is in charge of groundwater monitoring.

CHARACTERISTICS OF THE NETWORK

Water resources monitoring systems have been developed since 1980s. In 2020, 946 monitoring wells were part of the National Groundwater Monitoring Network of Vietnam, covering aquifers in the Northern Region, North Central Region, Central Highlands, South Central Coast and Southern Region, Figure 1. The collection of data is carried out manually and automatically, with more than 50% of the wells working automatically.

The automatic monitoring gauges are capable of monitoring and automatically transmitting data according to pre-set programs. Data is connected and transmitted via GSM/GPRS/3G/4G mobile networks. Through the use of automatic recording gauges and modern data transmission technology mentioned above, the observed data is always ensured synchronous, economical, accurate and timely, making an important contribution to the results and topicality of water resources forecasts and warning bulletins.
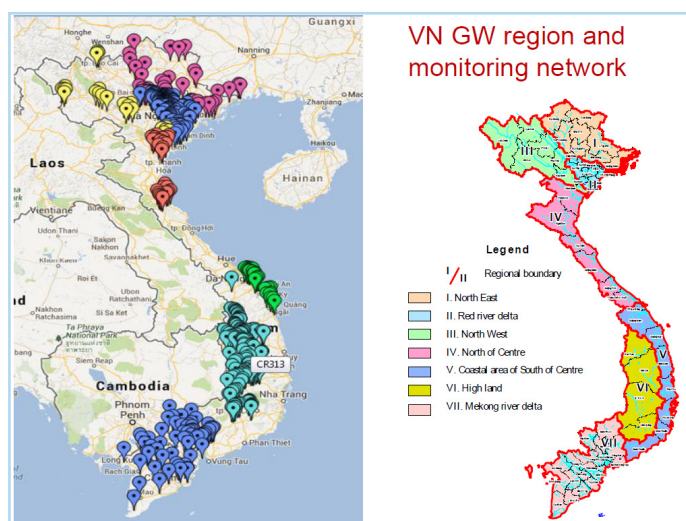

Figure 1 – Groundwater monitoring network in Vietnam. Source: Ministry of Agriculture, Livestock and Irrigation of Myanmar, March 2017, GGMN workshop
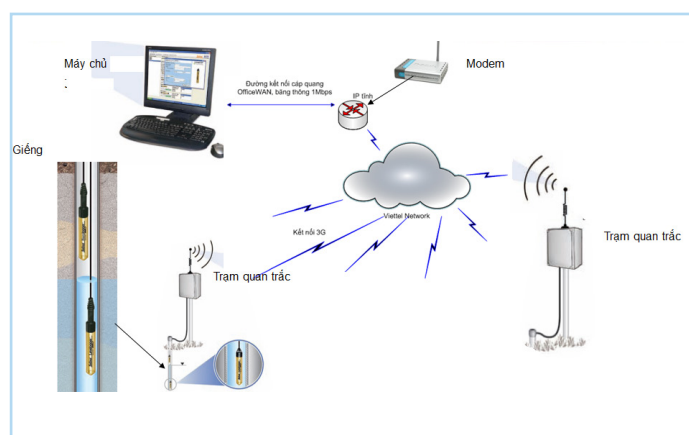

Figure 2 – Flowchart of automatic monitoring technology (Source: MONRE)

PROCESSING AND DISSEMINATION

Data from the field is automatically transferred to the National water resource database developed by NAWAPI, Figure 3. The database was established on the basis of modern technology for storage, unified management, and information sharing and exploitation, which improves cooperation among state agencies and makes a practical contribution to the socio-economic development.
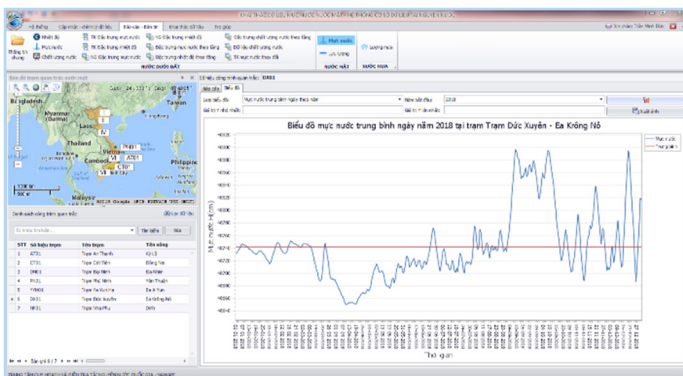
Figure 3 – National database software interface (Source: MONRE)

NAWAPI's database has been put into operation with the task of creating a convenient system for receiving, storing, sharing and exploiting information and data for multiple purposes, in a multidisciplinary way. In the future, the database will be fully integrated with the monitoring systems to be able to access and exploit real-time data.

On the other hand, there is a decentralized monitoring data management system working nationwide, Figure 4. The system provides and supports management tools as well as several types of monitoring data for different management, planning and information needs of society. The system provides data and information on water resources, forecasts and warnings throughout the country, and helps people and businesses to promptly and effectively access to them.
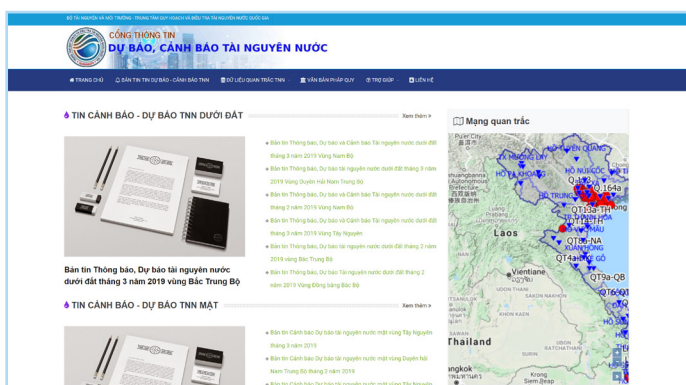

Figure 4 – Real-time water monitoring, forecasting and warning data portal operated by NAWAPI

Regarding simulation and computation, NAWAPI invested in one high-performance computer system, including two head node servers, two broker servers, twelve workstation computers, one central storage system, 38 workstations, and three monitors, to improve the quality of simulation and calculation for water resource warning forecasting. In addition, in the field of water quality analysis, NAWAPI also invested in a laboratory with modern analytical equipment with a high level of automation to facilitate observation and analysis of water quality.

In order to improve the quality of water resources warning and forecasting, NAWAPI has built and applied the MO operational system, which integrates models of hydrology, hydraulics, water balance and groundwater, in simulation and prediction works. In particular, this system has modules that allow the construction and management of simulation scenarios, real-time calculations with automatic connection to import, process data, run simulation models, and show results. Moreover, the system can compare scenarios and perform sensitivity analysis, as well as model optimization. Associated models in the MO system are licensed and updated regularly. The MO system can produce forecasts and warnings applied to groundwater resources (monitoring water levels and supporting decision making) in 5 regions (Northern Region, North Central Region, Central Highlands, South Central Coast and Southern Region). In addition, NAWAPI has also applied, combined and converted a number of mathematical models, as the conversion of a numerical model from GMS to Feflow and the calculation of saline intrusion in the Mekong Delta using GMS.

Groundwater data collected through the national monitoring network are stored in NAWAPI's database. Timeseries of groundwater parameters can be downloaded from the web portal, by request only. Monthly, quarterly and yearly notifications, warnings and forecasts are regularly published for localities and people in a timely manner. Those newsletters can also be downloaded easily through the NAWAPI's website and its portal dedicated for water monitoring and forecasting (see links in Sources section).

Sources

- Feedback from NAWAPI, MONRE - received on 29-09-2020;
- GGMN workshop in Thailand - 2016;
- NAWAPI's website (1) - http://www.nawapi.gov.vn/index.php;
- NAWAPI's website (2) - http://123.16.176.41/nawapinew/ (newsletters);
- NAWAPI's water monitoring and forecasting portal - http://123.16.176.41/lawis/public;
- MONRE main website - http://www.monre.gov.vn/English/Pages/Home.aspx; and
- Real-time water monitoring, forecasting and warning data portal operated by NAWAPI - http://123.16.176.41/lawis/public.