



## Case Study

### Wireless Groundwater Monitoring in Dam Project Yellow River

#### CHALLENGE

Obtain reliable and accurate groundwater level data in a remote and difficult to access location.

#### SOLUTION

Install, automate and maintain a groundwater monitoring network consisting of 9 monitoring wells. Collect, validate and manage groundwater data and disclose results on a web portal.

#### RESULTS

Easily available groundwater data to monitor influences on the environment.



Source: [www.chinahighlights.com](http://www.chinahighlights.com), designed by Cullen Chen

#### The Guxian Dam Project

Yellow River, also known as the “mother river of the Chinese people” is 5,464 kilometers long, making it the second-longest river in China (after the Yangtze), and the sixth longest in the world. This river is the most important water resource for the dry north of China, and is extremely prone to flooding.

In recent decades a number of dams have been constructed in the Yellow River to control flooding and enable better use of the water. In late 1990s the Ministry of Water Resource started a feasibility study to build a new dam — named the Guxian Dam — on the middle reach of the river. The roller-compacted concrete dam is deemed a key infrastructure in the regulation system and aims to bring long-term stability to the river.

The dam is designed to have a maximum height of 215 meters. Upon completion it will create a lake with a volume of nearly 13 km<sup>3</sup>, which can irrigate about 697,000 hectares of farmlands and benefit millions of farmers. Meanwhile, the dam will have an installed capacity of 21 megawatts and generate electricity of 5.4 terawatt-hours every year.

#### Environmental Impact

Despite the enormous benefits the dam could bring; potential environmental impacts should not be ignored. Concerns include — what does the water rise mean to the geologic stability of the canyon? How will the inundation change the groundwater system and thus the local ecosystem? To answer these questions, a groundwater level monitoring project was started during pre-concept stage and aims to keep operating for many years after completion of the dam.

The Yellow River Engineering Consulting Co., Ltd. (YREC) is one of the main stakeholders involved in planning and designing the dam. YREC drilled many boreholes near the site for geologic studies. Located on top of mountains, most of the boreholes are several hundreds of meters in depth. After geologic data was collected, some of the boreholes were chosen to be groundwater monitoring wells.



The monitoring team faced following challenges:

- The monitoring site is 450 km away from YREC. It takes two days to reach the site and another two days to return.
- Monitoring wells sit on steep hills beside the massive yellow river. Traveling among them not only takes much of time but also poses serious security concerns.

#### Diver-Link

YREC has over 10-year experience of using Diver data loggers produced by Van Essen Instruments. In this project YREC not only continued their trust in Divers but also became the first customer in China who deployed Diver-Link — a telemetry unit that transfers groundwater monitoring data through the GPRS network to a secured central database server.



*A groundwater monitoring well sitting on top of a mountain beside yellow river.*

Nine monitoring wells were selected and each well was installed with a set of TD-Divers and Diver-Link. The data are sampled every hour and transferred to the Diver-Hub server every four hours. Sitting in the office the customer just needs to log into the Diver-HUB web portal to acquire the near real-time data or check the status of the equipment in the field.

Equipment and software used:

- TD-Diver
- Diver-Link
- DXT-Cable
- Smart Interface Cable
- Diver-Office

