

## RIVER WATER MONITORING IN BANGKOK USING WTW SPECTRAL SENSORS



A multi-branch network of channels covering hundreds of square kilometers, also referred to as Khlongs, connects the adjacent rivers Chao Phraya, Tha Chin and Bang Pakong in Bangkok. This Khlong network is utilized as a transport route, as a drainage system for storm and flood events, as a circulation system for brackish water for the shrimp farms at the southern end of the city, as well as a transport medium for wastewater via the rivers into the ocean.

According to the “Thailand State of Pollution Report 2015” of the Thai Pollution Control Departments (PCD), the quality of the surface waters was evaluated as good in 34%, as moderate in 41% and as poor in 25%.

Especially in the metropolitan area of Bangkok with its high population and industrial density and insufficient wastewater treatment capacities, currently, approximately 55% of the wastewater reach the Khlongs and rivers in an untreated state.

Numerous activities are intended to improve the general quality of the water in Thailand. The planned construction of four new wastewater treatment plants in Bangkok by the Bangkok Metropolitan Administration (BMA) is intended to significantly increase the portion of the wastewater volume treated by wastewater treatment plants. The Thai cabinet has approved a two-year action plan to improve the water quality of the Saen Saep's Khlong. Public campaigns are supposed to sharpen the population's environmental awareness regarding water contamination and solution approaches to improve the water quality.

Last, but not least, the existing system for the monitoring of the water quality in the metro region of Bangkok is to be expanded further. There are plans to install additional automatic river water measuring stations at various Khlongs and at the river Chao Phraya, which flows through Bangkok.

The operators of these river water measuring stations are the BMA and the PCD. The measured data recorded by their sensors can be transmitted to central servers. This data can be integrated into models for water quality early warning systems along with additional measuring data such as precipitation volumes, levels and flow measurements. In addition, the data for a five-level waterquality evaluation (very good, good, sufficient, poor, very poor) are used and published for a max. transparency for the population on the home page of the PCD.

As of now in 2023, the Thai business partner of Xylem Analytics Germany Sales, Green Banyan Co. Ltd., has equipped a total of



A measuring station at the river Chao Phraya in the city center of Bangkok.



A Khlong in the city center of Bangkok.



Khlong, where NiCaVis® 705 IQ tests for COD and nitrate were conducted by means of the spectral sensor. Discharged/inlet by a wastewater treatment plant in an industrial park in immediate vicinity.



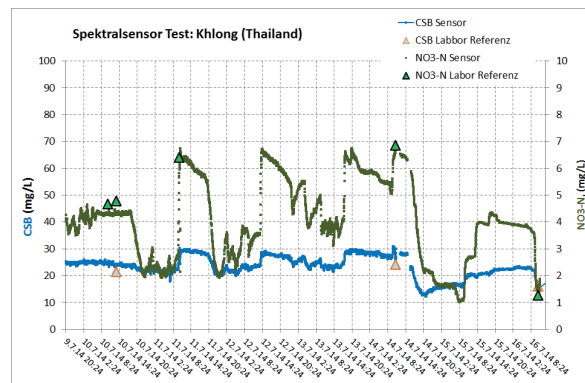
Water sampling site of a measuring station. The water is sampled by means of a submersion pump which is protected from debris and quick occlusion by a rough underwater metal cage. The sampling site is equipped with a floaters to allow water sampling during severely fluctuating water levels.



One of the 16 newly installed river water measuring stations in the metropolitan area of Bangkok. It is fitted with a housing to prevent vandalism and theft of measuring devices.



A spectral sensor with flow-through fitting, as well as additional compressed air cleaning, installed at the back of the measuring station.



The inside of the measuring station with IQ controllers, a cleaning air box for the additional cleaning of the spectral sensor by means of compressed air as well as a modem for remote data transfer. To the left is the flow-through basin with installed oxygen, pH, conductivity and turbidity sensors.



A measuring station at a Khlong in the city center.

+200 state-owned river water measuring stations for the measurement of water quality in the metropolitan area of Bangkok with measuring devices manufactured by WTW brand. The measured standard parameters are oxygen, turbidity, pH value and conductivity. Another 16 measuring stations were added which measure the additional chemical (COD) and the biochemical oxygen demand (BOD) as parameters for the organic load, as well as nitrate by means of spectral sensors (NiCaVis® 705 IQ).

The decision to use WTW online spectral sensors in river water monitoring applications, which were originally intended for use in municipal wastewater, was preceded by extensive testing in different Khlongs. The very good match of sensor-COD- and nitrate values with laboratory reference values, which was determined in the course of COD and cuvette tests, convinced Green Banyan and their customers PCD and BMA regarding the spectral measuring principle. The graph shows COD and nitrate data from the test phase on a Khlong, where purified water is discharged from a wastewater treatment plant at an industrial park. One of the photos shows the measuring site of this test.

The continuously operating ultrasound cleaning system which is integrated in the spectral sensors, as well as the additionally installed compressed air cleaning system allowed the generation of reliable measured values over time frames of several weeks without frequent manual cleaning of the measuring windows. The sensors were usually not installed directly in the Khlongs or rivers, but the water sample was pumped into the measuring station on the shore by means of submersion pumps. The measuring stations are equipped with flow-through units for the sensors, data storage and modems for remote data transmission.

### Author Contact Details

Xylem Water Solutions Singapore Pte Ltd

• Address: 3A International Business Park, #10-10/18 ICON@IBP Singapore 609935 • Email: info.em@xylem.com • Web: www.xylem.com

**xylem**  
Let's Solve Water