Czech Republic Buys Water Quality Data – Not Instruments

YSI Continuous Water Quality Data
Application Note A528-02

The collection of water quality data from remote locations with difficult access represents a significant challenge. However, data from such water resources can be highly valuable in the detection of diffuse pollution.

YSI manufacturers water quality monitoring instrumentation with significant improvements to that have resulted in an extension of the time required between visits to installed monitors with many anti-fouling techniques to fight biofouling. For example, we have many water quality monitoring sondes that are able to monitor 10+ parameters in high-fouling environments such as our EXO2 sondes. However, even with advances such as these, the collection of water quality data can represent an activity which some organizations do not have the resources to undertake.

In one such example, in the Czech Republic, a local firm of water quality specialists was employed to collect data in the Jizera Mountains. The project was designed so that it was not necessary to purchase new monitoring equipment or to employ and train staff for its operation.

The Jizera Mountains represent a fragile environment; granite bedrock and peat soils make the ecosystem naturally acidic with low neutralizing capacity. As a result it is particularly sensitive to acid rain, and has suffered considerably over the last few decades. The watersheds of the Jizera Mountains are important in that they supply one fifth of the Czech Republic's water, including that for the capital city, Prague.

The mountains nestle between the Lusatian and Giant Mountains, to the North of the Czech Republic on the border with Poland. Ecological stability has been affected by the gradual replacement of traditional beech forests (with relatively high tolerance to acid deposition) by artificially introduced spruce monocultures. Historically, prevailing winds have brought acid rain created by sulphur dioxide emissions from power industries, located both within the country and in neighbouring Germany and Poland. The legacy of this pollution is believed to remain within the Jizera's acid soils. Forest damage took place for a number of years, particularly in the 1980s and fish kills have been reported.

A gauging station monitoring site in the Jizera Mountains.

A project is now under way to monitor a catchment area within the Jizera Mountains. The project aims to monitor a wide range of environmental parameters, so that a complete picture of the ecosystem can be created. In the past, research work has been based on weekly sampling, at best, and this has often failed to reveal specific incidents, such as changes in water quality during ice-melt. The project therefore sought to provide continuous monitoring data.

The project is part of 'Project Labe IV' and the work is being performed by a private company, The Flow Group, in conjunction with the Czech Hydrometeorological Institute on behalf of the Research Water Resources Institute T.G.M. in Prague.

The project sponsor has not purchased monitoring equipment, preferring instead to simply purchase data from The Flow Group, who have been responsible for the installation, maintenance and management of the monitoring equipment.

The benefits of buying data rather than instruments are that costs are clearly established from the start; there are no issues with unnecessary equipment at the end of the project; and it is not necessary to employ technical staff to install, operate and maintain the equipment.

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The Flow Group specialises in environmental monitoring; the company already has technical staff and maintains a stock of environmental instrumentation, so it makes sense for it to take ownership of the monitoring activity.

The Flow Group chose to deploy three YSI multiparameter sondes because of their reliability, data handling capability and accuracy. The parameters for measurement included temperature, conductivity, pH, oxidation/reduction potential (ORP), chloride, nitrate and depth. Two sondes were installed at gauging stations within tributaries that feed a reservoir, and a third at the source of one of the tributaries.

Prior to the installation of these continuous water quality monitors, samples had been taken for subsequent laboratory analysis. However, the sampling points were remote and access was difficult so site visits were costly and problematic. Furthermore, spot sampling did not reveal a sufficiently accurate picture of water quality in that any diurnal trends and events occurring between sampling were missed. For example, since the continuous monitoring sondes have been deployed, a reduction in pH from 6.2 to 4.2 has been identified during ice melt.

The Flow Group visits the sites every three weeks to check calibration (mainly for Cl^- and NO_3^-) and to take reference samples for laboratory analysis. The staff have been delighted with the reliability and accuracy of the YSI sondes, not least because they now have to make the 300 km journey much less frequently.

Commenting on the technology that enables long-term deployment, Ian Thompson, European Manager for YSI, says, "whilst it is now possible to leave many of our monitors unattended for months at a time, we still recommend visits. This is because local conditions may affect the data quality. For example, equipment may suffer from physical damage such as vandalism, and consequently occasional visits are still worthwhile."

YSI multiparameter sonde deployed under the ice.

In summary, this project raises the issue of instrumentation ownership. Essentially, the ownership of instrumentation is simply a means to an end, which is the data itself. So, if data is required on an ongoing basis and resources (qualified staff) are available, it will usually be necessary to purchase monitoring equipment. However, if data is only required over the length of a project and staff resources are not available it may be more economical to buy the data; if staff are available it might make sense to rent the monitoring equipment.

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