

57 Quality Incidents in the Ebro River Basin. Achieving Environmental Sustainability Step by Step



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DE AGRICULTURA, ALIMENTACIÓN
Y MEDIO AMBIENTE

CONFEDERACIÓN
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DEL EBRO



Vicente Sancho Tello

Head of the *Automatic Water Quality Information System* at the Ebro River Basin Authority (Ministry of Agriculture, Food and Environmental Affairs). SPAIN

Abstract

Every year, the Ebro River Basin Authority (CHE) implements an action plan to prevent and reduce pollution of surface and groundwater in the Ebro River Basin and to protect the interests of all users - drinking water treatment plants, irrigation communities, industries, fish farms, hydroelectric power stations, wastewater treatment plants... and citizens.

In line with an innovation strategy, the CHE began implementing an automatic water quality monitoring network in 1993. In 2014, over one million events and alarms were registered resulting in the detection of 57 cases of pollution. With early warning contingency planning was improved, the impact of pollution on the environment was minimised and social and economic benefits were guaranteed. These include assuring the quality of supply to drinking water treatment plants and optimal water quality for irrigation, industry, bathing, etc.

"Adasa's online water quality analysis products and the automatic alert stations enable the monitoring and diagnosis of incidents, allowing us to know the characteristics and origin of discharges. We have achieved full compliance with the EU Water Framework Directive to successfully improve the river health and ensure the population's wellbeing."



Automatic water quality control station for chemical discharges - Mercury monitoring (Ascó. Tarragona).

Benefits

- Obtain real time information and historic records to support decision making and the definition of action plans that foster sustainable water use.
- Enable quick action to mitigate pollution events, detecting the origin of uncontrolled spills.
- Provide all users with real time water quality information to help them manage their activities (drinking supply, irrigation and agricultural uses, industrial uses, aquiculture, recreational uses, hydroelectric power stations...).
- Increase the environmental awareness of citizens and industries.
- Complement manual sampling, providing key information related to water quality trends and watercourse profiles.

The Ebro River Basin Authority (CHE), which operates under the aegis of the Ministry of Agriculture, Food and Environmental Affairs, is responsible for the management of the Ebro River Basin. With respect to water quality, the responsibilities encompass both surface water and groundwater and specifically to ensure that water is in good chemical and environmental condition.

Each year, the CHE implements a contingency plan based on potential environmental impacts and the end use of the water (drinking, irrigation and agricultural uses, industrial uses, aquiculture, recreational uses, hydroelectric power stations or wastewater treatment plants).

Central to this plan is a set of environmental monitoring points in the basin's rivers, designed for periodic sampling & monitoring of surface water. In addition to the basic physicochemical indicators, monitoring includes biological, hydro-morphological and hydro-geomorphological indicators.

The periodic sampling provides information on quality trends and highlights deviations in parameters. It enables profiling of the watercourses sampled thanks to extensive historic data. However, the Ebro River Basin has a number of critical points where there is a greater risk of adverse water quality incidents that may not be identified by periodic sampling or, at best, they are detected through the impact on biological communities such as fish stocks or at water treatment plants. Even if detected in this way, the origin of the problem cannot be identified.

For this reason, these points require intensive monitoring that guarantees rapid action and serves to help identify the possible cause of the incident and secure appropriate water quality for all users.

Such exhaustive, decisive control is possible thanks to an automatic quality alert network, comprising facilities that provide continuous information to a control centre on physicochemical water quality parameters (temperature, pH, ammonium or nitrate content, etc.). This makes it possible to monitor water quality trends and detect incidents.

Programmes for river monitoring must comply with the different national regulations and European directives, including the Water Framework Directive (WFD) and the European Nitrates Directive, which establish a framework for the protection of different water masses and set out the necessary ecological and physicochemical criteria for preventing and reducing pollution, fostering sustainable use and improving the situation of aquatic ecosystems.

With these clear challenges in mind, in 1993 the CHE, committed to an innovative, pioneering strategy and implemented a network of automatic alert and control stations to provide continuous monitoring of the quality of surface water. These stations are located at strategic points, mainly selected for protecting water supply and controlling water quality.



Interior view of station. Automatic water quality monitoring equipment.

Special Monitoring at Strategic Points

Lindane (gamma-hexachlorocyclohexane or γ -HCH) pollution of the Gállego River (as a result of industrial waste from a chemical complex that was abandoned in the 1990s) requires intensive monitoring by the water quality control service. For example, sampling is automatically triggered during rainfall episodes in the area, which can carry contaminated water, increase the turbidity of the river and facilitate the movement of lindane in association with suspended solids. “The periodic samples taken provide us with key information on the pollution and allow us to take steps to minimise potential environmental impacts”, points out Vicente Sancho Tello.

Another point of special interest is monitoring the potential contamination of the Ebro River as a result of the chemical decontamination work being carried out in the Flix Reservoir, which has been affected by chemical discharges for over a century, with mercury being one of the main components. The automatic quality alert network is a valuable instrument for the purpose of defining some of the guidelines for the decontamination programme and identifying other possible sources of pollution.



Decontamination of the Flix Reservoir.

Satisfying the Water Demand of the Population

As part of the Water Framework Directive monitoring programmes, sample-taking is carried out in drinking water catchment areas, as well as in areas susceptible to nutrient pollution.

Monitoring of the trophic state and ecological potential is carried out at 35 of the 59 reservoirs of the Ebro River Basin. “On numerous occasions, the Tranquera Reservoir has been seen to have a yellowish colour due to the presence of algae and the oxygen at depth has been consumed. The resulting environment without oxygen has caused the movement of certain decanted elements, such as iron and manganese” says Javier San Román – Head of the Water Quality Area at the Ebro River Basin Authority.

The CHE continues to be committed to new technologies that provide real time information if water quality at the different levels of the reservoir. This enables the depth for water extraction to be determined in accordance with end use (drinking water, irrigation...) and reduces the costs of managing the resource. “Thanks to limnological studies carried out by the water quality data provided by automatic sounding devices, we have been able to identify the cause of these problems and resolve them by moving the water intake at higher levels, thereby ensuring optimum drinking water quality” explains Javier San Román.

Another significant problem that can be measured with the aid of the automatic networks is the inappropriate use of fertilisers, which cause increased nitrate concentrations in many aquifers, rivers, lakes and reservoirs, thereby creating significant environmental problems and adversely affecting different water users.

Finally, the CHE is responsible for the control and inspection of contaminating emissions from urban wastewater, as well as the control and inspection of activities that result in greatest pollution of the river basin, such as the chemical and paper industries.

A number of parameters considered to be general indicators of water pollution are automatically determined at the quality alert stations managed by the CHE: pH, temperature of the water, conductivity, dissolved oxygen, turbidity, water level and total ammonium. Some stations are fitted with equipment to measure more specific parameters, such as nitrates, absorbance at 254 nm, phosphates and mercury. All the stations are equipped with an automatic, refrigerated sample-taking unit that can operate in programmable frequencies. The samples are conserved in a refrigerated environment in case they are subsequently required for verification or research analyses. Such analyses may be routine or may be required in the event of a quality incident.

Some of the stations are fitted with photographic equipment for the taking of instant photographs in order to provide visual evidence of the state of the water masses.

“The real time water quality monitoring supports decision making and helps to define contingency plans for pollution events.”

Data monitoring and management is carried out from the control centre of the system. By way of illustration, in 2014, more than 12.5 million measurements were taken and over one million events and alarms were registered. Thanks to these reports, a total of 57 quality episodes were identified, mostly related to increases in ammonium or conductivity caused by unauthorised discharges, wastewater treatment plant issues, heavy rainfall or large increases in river flows.

All the information and documentation generated by the automatic alert network (real time and historic results, daily reports, specific reports, etc.) are available to users with differing profiles for the purpose of promoting efficient use of water and more effective decision-making when dealing with potential pollution episodes.

“In 2014, over 1 million events and alarms were registered”

Similarly, in order to foster open, transparent communication with citizens, the CHE is committed to the exchange of environmental information and the results of these analyses are published on the website of the Ebro River Basin Authority and reported to EU authorities, in full compliance with the WFD.

There are currently 562 registered users making significant use of the real time water quality information in carrying out their activities (drinking water treatment plants, irrigation communities, industries, fish farms, hydroelectric power stations, WWTPs...).

“Over 500 end-users benefit from real time water quality information including drinking water treatment plants, irrigation communities, industries, fish farms, hydroelectric power stations and wastewater treatment plants”



Tranquera Reservoir (Zaragoza). aquaDam, reservoir water quality monitoring at different levels.



Public portal for the dissemination of water quality results.

About Adasa

Set up in 1988, Adasa is a recognised engineering company that offers advanced water quality monitoring solutions. We understand the needs of water and wastewater applications and have proven capabilities in all facets of design, manufacturing and maintenance of major control systems, communication, monitoring equipment and application software.

Adasa products and solutions can help you to: detect pollution alerts and uncontrolled spills, improve WWTP process efficiency by making treatment decisions based on real time water quality conditions, make informed decisions in water discharges, protect the drinking water treatment plants catchments and understand the dynamic of reservoir, dams and deposits of water, allowing management resolutions depending on end use and demand (fish life, bathing water, drinking water, irrigation...).