

## **An integrated early warning monitoring system for waste water treatment plants control in coastal areas**

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An innovative integrated early warning monitoring system for waste water treatment plants control has been designed and developed in an highly tourist coastal region of Ionio sea in Calabria, Italy.

Using a specific financed support of the Italian Ministry of Environment, the monitoring project has been financed and managed by the local Administration of Calabria region.

This local Administration is actually very interested to ensure a sustainable increase of tourist activities, which have to be compatible with the maintenance of a clean environment.

Two different types of monitoring systems compose the system:

- an highly automated fixed monitoring station, installed inside each waste water treatment plant, designed to measure at least the following important quality parameters either on the inlet and the outlet of the treated water: temperature, pH, conductivity, dissolved oxygen, turbidity, ammonia, nitrate, nitrite, orthophosphate, total nitrogen, total phosphorus, COD
- an innovative sea water monitoring buoy, installed in defined sites along the coast area, which can automatically measure the following large subset of quality parameters in sea water: temperature, pH, conductivity, dissolved oxygen, turbidity, ammonia, nitrate, nitrite, orthophosphate, with the automatic correlation of current direction and speed measurements.

Both the systems (for waste water and sea water measurements) use the same analytical technology (**Loop Flow Analysis**), based on international accepted standard colorimetric methods for the automatic measurement of chemical compounds, ensuring a simple and reliable acquisition and comparison of the collected results too.

To maintain the best systems performances and to reduce the maintenance level, periodic automatic calibrations of chemical analysers and a particular automatic washing procedure has been studied in waste water measurement stations to clean all the hydraulic equipment after each measurement.

Regarding data transmission, both the fixed stations and the buoys automatically send measured data and specific alarms to one or more data collection systems and to predefined cellular phones, by means of SMS (Short Message Service) utility of GSM commercial network.

The buoys can be also completely managed for configuration, maintenance and test purposes using SMS messages sent by the data collection system or by individual technical operators using their own cellular phones.

The principal aims of the integrated system are:

- to take a complete process and quality control of the treatment process performed inside each plant, particularly heavy during summer periods when the people grows up to ten times due to tourist incoming
- to ensure that the water processed by each treatment plant can be used daily for industrial and agricultural purposes, due to the growing lack of water particularly diffused in this Mediterranean areas
- to provide a reliable early warning to technical operators due to specific problems in treatment process, giving automatic alarms in the case of detection of pollutants concentrations over defined threshold levels
- to preserve the quality of the surrounding coast, particularly in protected areas like the Marine Natural Reserve “Capo Rizzuto”, which is one of the most important protected areas in the Southern part of Italy.

Actually, three complete monitoring stations and two sea water monitoring buoys has been already installed and put into operation; in particular, the two buoys have been installed directly inside the Marine Natural Reserve “Capo Rizzuto”, due to the adjacent presence of two waste water treatment plants.

During the next year the system will be upgraded with more stations and buoys, in order to complete the automatic survey of all the coastal areas from Catanzaro to Crotona districts.