The 5th International Symposium on Water Resource and Environmental Management (WREM 2022)

Sanya, China / December 9-10, 2022

Patrol of water resources in natural and artificial systems

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Abstract

Water resources, being one of the most important natural resources, face major threats due to contamination by pollutants of various types and origins. Consequently, preservation, protection and sustainable use of natural resources is increasingly important. The "DragonFly" project aims to develop a system that solves the need for monitoring the quality of surface water in natural and artificial systems of different types, on a continuous and regular basis. It is intended to acquire water quality data in order to identify sources of pollution or to estimate the discharge and dispersion of contaminants along water courses.

The system was specified to allow the acquisition of a specific set of environmental data that characterize the aquatic environment and help to detect variations (deviation) in water quality, such as temperature, pH, dissolved oxygen, redox, conductivity, salinity and dissolved solids.

The Castelo do Bode reservoir, was adopted in this work as a data acquisition area and for the development and testing of the system, due to its geographical proximity. It is the main national water reservoir for public supply in Portugal with a maximum extension of 60 km, covering an area of about 3 300 ha.

The acquisition of real-time data is an essential condition in this type of applications, as it will allow the immediate detection of pollution points and a timely action on it. The available data continuity and regularity will allow the support of the aquatic environment studies and the forecasting systems modelling of future conditions, guiding the decision processes.

To achieve this objective, a physical prototype was developed based on an electric unmanned surface vehicle (USV), to which several modules and/or satellite vehicles can be added, and which is already implemented at an advanced stage.

In order to guarantee the continuity and regularity of the available data and to reduce system maintenance times and costs, it is necessary to ensure the autonomous operation of the supply system. Energy storage systems, autonomous recharging systems and independent energy conversion and storage systems are now being designed.

The design of a versatile real-time water quality monitoring system contributes to the management and protection of water resources thus it can increase security in the water supply of populations and turn the resources management more efficient and sustainable.