Receptivity of water managers towards underwater unmanned technology

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Introduction/Objectives

Inland surface water systems are characterized by constant variations in time and space. The increased pressure, of natural or anthropic origin, as a consequence of climate change, population growth and urban development accentuate these changes. Effective water management is key to achieve European water quality and ecological goals. This is only possible with accurate and extensive knowledge of water systems. The collection of data using platforms such as underwater, water surface or aerial drones is gradually becoming more common and appraised. However, these are not yet standard practice in water management. This work addresses the receptivity of water managers in the Netherlands towards underwater drone technology:

- Listing and testing of suitable applications;
- Comparison between data requirements of water managers (e.g. legislation) and data that underwater drones can provide;
- Identification of features should R&D projects focus to increase the interest of the water sector.

Methods

Unmanned underwater vehicles (remote controlled) were combined with water quality sensors and underwater cameras and were tested in different locations and projects. The test locations and tasks were selected based on consultations with several water authorities from The Netherlands. After the measurements, workshops and feedback meetings were organized to present results and assess the value of the data collected around the world (Africa, Asia, Europe).

Results

The underwater drones used are relatively simple to setup and to operate and provided spatial distributed data as well as underwater images. Image 1 shows examples of data generated by underwater drones that illustrate the spatial variability of water quality parameters and of underwater biodiversity (e.g. aquatic plants, fish or mussels). Water managers were satisfied with results and see high potential and value for the collected data (e.g. Information about aquatic ecosystems, stratification assessment, or water quality trends)

Image 1 –Images captured by underwater drones of aquatic plants (left), fish (center), and spatial distribution of electrical conductivity near a shoreline (right)

Conclusions

The collected data proved to be useful in most of the test locations, and provided a unique insight into water environments that could not easily be obtained with other methods (due to costs, time, and accessibility/safety). However, certain parameters that are requested by legislation can't currently be measured with sensors, which restricts the exclusive use of drones. Based on the findings, new features that could be implemented in the drones are suggested, such as using laser scaling techniques to estimate the size of fish/sediments/plants, or to collect water samples.