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INTCATCH 2020: "Development and application of Novel, Integrated Tools for Monitoring and Managing Catchments"

An innovative large-scale monitoring strategy with Autonomous Boats in Lake Yliki in comparison with traditional sampling

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Introduction

Lake Yliki (Fig.1) is a natural lake located in central Greece that covers an area of 19.1 km^2 and is considered as the most important water supplier of drinking water in case of emergencies for the cities of Athens and Piraeus (4.5 million inhabitants). In present EYDAP includes in its quality control program manned campaigns to monitor the trophic state of the lake and specific parameters that can reveal potential algae blooms (Fig.2).

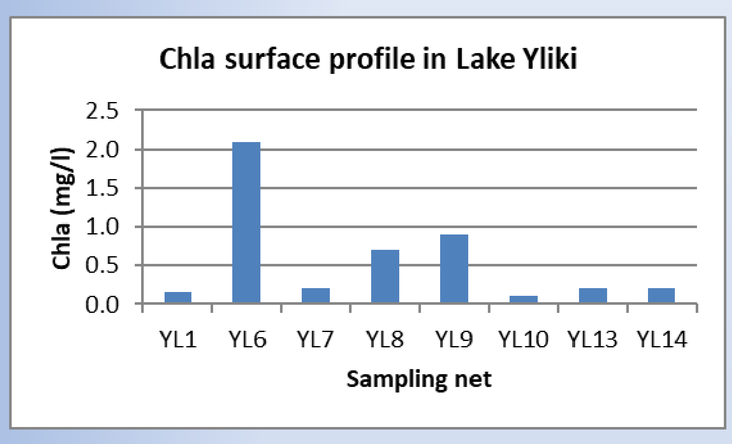


Fig.2: Chlorophyll-a surface profile in Lake Yliki during August 2018, with AlgaeTorch bbe++ sensor.

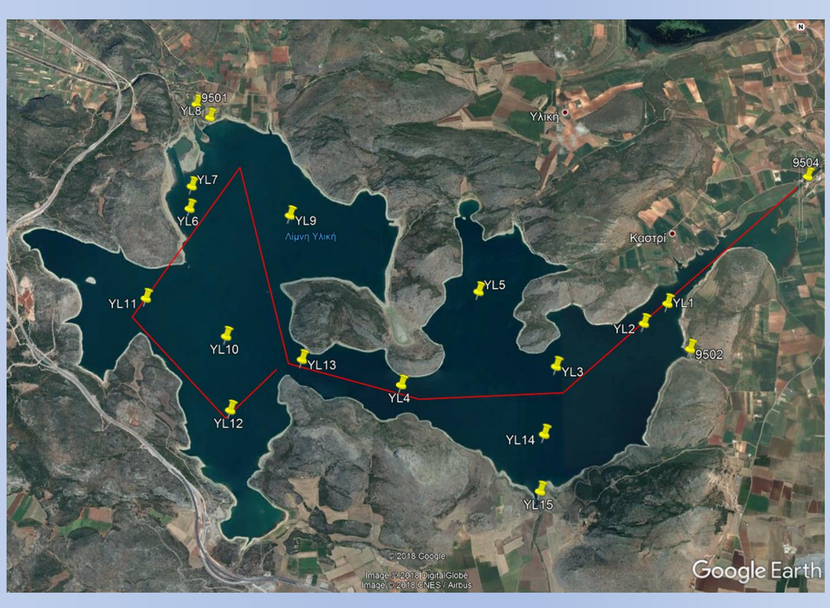


Fig.1: Surface measurements Lake Yliki August 2018
*Red line indicate a sampling net of more than 30 km

Aim of the study

The use of autonomous and radio controlled boats (Fig.3,4) equipped with specific sensors (pH, Conductivity, DO, Chla) allows monitoring of water quality in a large area of the lake with greater frequency than the current sampling methods. By using this continuous monitoring system potential sources and pathways of pollution will be identified in real time (Fig.5,6) and the results will provide the opportunity to have a more comprehensive picture of the quality of the lake and take immediate countermeasures.

Fig.3: EYDAP team along with electronics specialist Alexandros Dosis testing Autonomous Boats in Lake Garda, with pH, DO and Conductivity sensors, October 2018

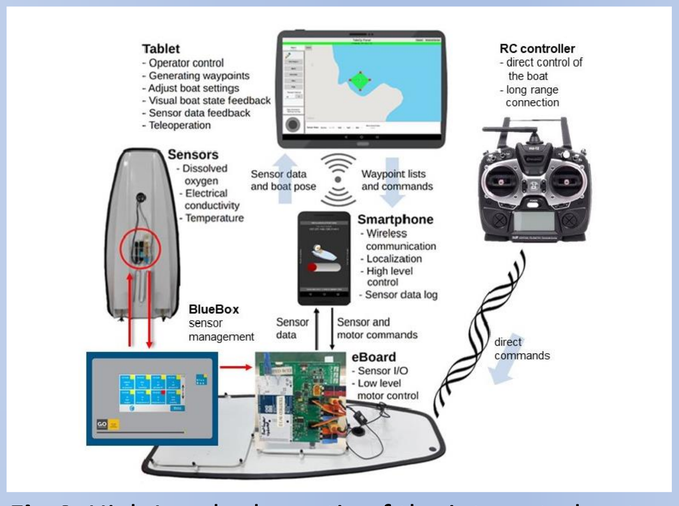
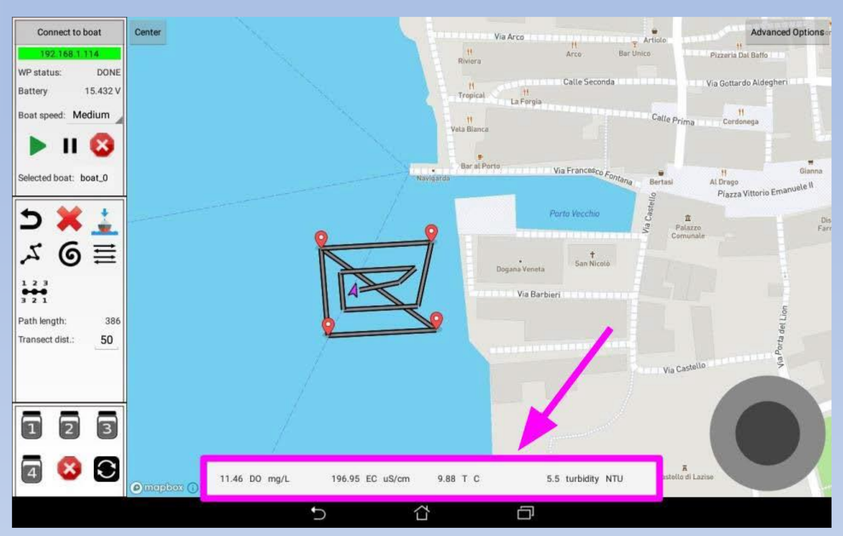


Fig.4: High Level schematic of the integrated system

Water Quality Monitoring in Lake Yliki vs INTCATCH environmental objectives

The boats will be demonstrated for one year in Lake Yliki, and their real time results in addition with the existing data will develop monitoring strategies for Lake Yliki on catchment scale:

- For Lake Yliki it is important to preserve the current water quality conditions and if possible upgrade to high ecological status.
- The main challenges when considering a change in current monitoring practice are related to a reliable and cost effective monitoring that would allow the identification of hot spots in the lake where pollution is more intensive and where specific measures could be proposed and implemented.
- Water quality improvement that would potentially reduce the level of water treatment will allow for low treatment cost and saving of resources would also be beneficial. For example, there are occasional algae blooms within the Lake which online monitoring could aid in identifying and tackling early on.
- The potential to combine monitoring results with decisions, through a Decision Support System (DSS) will allow for more flexible and sustainable management of the water of the Lake Yliki.



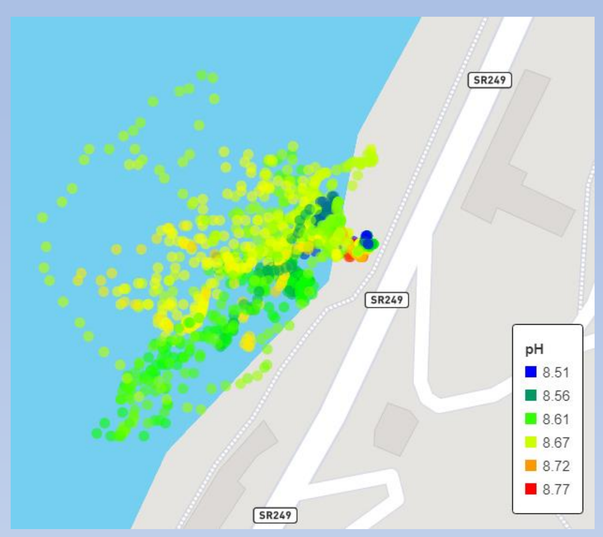


Fig.5: Tablet control application of Autonomous Boats and Data Visualization (eg pH) with INTCATCH software (WAQUIN)

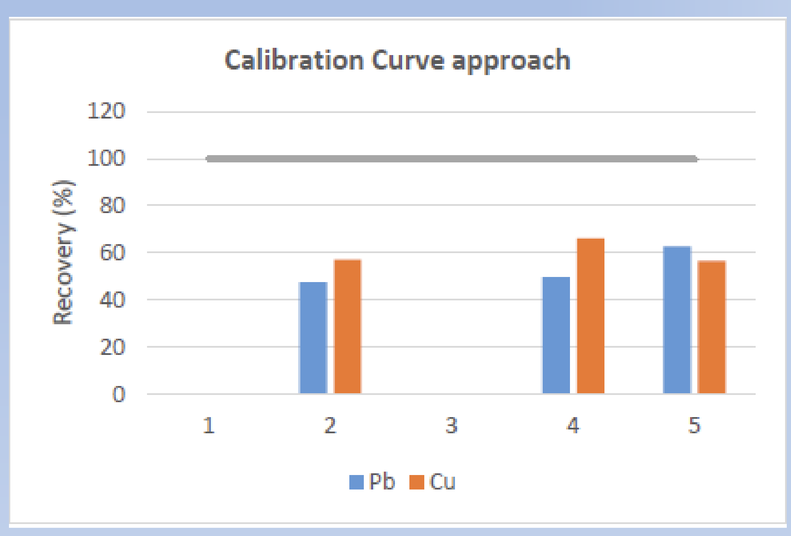


Fig.6: Heavy Metals (Pd and Cu) detection by Square Wave Anodic Stripping Voltammetry (SW-ASV)

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