An Innovative Toolkit for Enhanced Water Quality Monitoring of Water Supply Network

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Global challenges like climate change and emerging pollutants are increasingly affecting drinking water supply and treatment. In response, Athens Water Supply and Sewerage Company S.A. (EYDAP S.A.) is continuously improving its water quality monitoring processes, from source to treatment, in line with the updated EU Drinking Water Directive 2020/2184 [1]. As part of this effort, EYDAP is testing the innovative Toolkit from the Horizon Europe project "ToDrinQ." The Toolkit is demonstrated at Lake Yliki, in boreholes (e.g., Mavrosouvala), and throughout the water supply network to the Polydendri Water Treatment Plant (PWTP). Specific challenges have been identified, to be investigated using hard sensors (for Nitrates, Lead and Total Bacteria) and soft sensors (for Chlorophyll-a, algal bloom events and nutrients runoff). Additionally, EYDAP's Unmanned Surface Vehicle (USV) operates seasonally in Lake Yliki collecting thousands of data points for real-time monitoring and for calibrating soft sensors. In July 2024, after a long period, Lake Yliki resumed supplying water to the PWTP, enabling an integrated monitoring strategy. EYDAP's strategy involved: i) the USV to collect data and samples, ii) analyzed them in the laboratory (LD) and iii) online sensors along the canal, allowing adaptation to real-time changes in water quality and ensuring the continuous delivery of high-quality drinking water to consumers.

Table 1: Innovative Monitoring Strategy for the Water Supply Network combining Data from Laboratory Analyses (LD) and Unmanned Surface Vehicle (USV) from Lake Yliki and PWTP, July 2024

Sampling Point/ Parameter	Method	Centre Lake Yliki	Earth Dam of Artificial Lake	Artificial Lake Yliki	PWTP Influent (LD)
Chl-a (μg/l)	USV	1.5 – 3.9	5.1 – 10	11 – 28	N.A.
EC (μS/cm)	USV	434 – 484	490 – 520	530 – 660	365 – 390
pH	USV	8.12 – 8.22	8.21 – 8.32	8.33 – 8.41	7.86 – 8.07
O2 (μg/l)	USV	7.22 – 7.95	8.10 – 8.45	8.80 – 9.45	N.A.
TN (mg/l)	LD	< 1.2	< 1.2	1.2	N.D.
NO_3^- (mg/l)	LD	≤ 0.56	N.D.	< 0.5	0.7 – 1.1
Pb (μg/l)	LD	N.D.	< 2.4	< 2.4	< 2.4
Total Bacteria	LD	1500 – 2900	N.A.	N.A.	15 – 8200

N.D.: Not Detected, N.A.: Not Analysed

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References:

[1] EU Drinking Water Directive Directive (EU) 2020/2184 of the European Parliament and of the Council of 16/12/2020 on the quality of water intended for human consumption (recast).