An integrated approach for water quality assessment in Albania

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Water quality is among the most discussed issues in the context of climate change, and so are the methodologies used to assess it. In this context, standardized methods for measuring physical-chemical indicators, trophic state, and bacteriological indicators have been traditionally used by the public and private institutions in Albania to address the issue. However, describing the whole picture of the situation in fresh, marine, or lagoon waters needs the employment of a strategy that considers as many factors as possible (climatic, hydrological, geological, biological, chemical, human-made). Here we discuss an integrated approach for the evaluation of the quality of water based on the simultaneous use of both ISO and research protocols, which provide information on the chemical composition of the water, the presence of pathogenic bacteria of importance for human health, trophic state, which explains how healthy the water environment is for micro and macro inhabitants, impact of different categories of pollutants (heavy metals, pesticides, herbicides, etc.) might have on organisms, the role of environmental characteristics on phytoplankton community biomass and composition, etc. The methods used to assess the proper parameters, by the Department of Biotechnology of the University of Tirana, for this purpose are: physical-chemical indicators - ISO 17025, pathogenic bacteria using indicator species – ISO 16649-3:2015, Trophic State (Carlson Index) - ISO 17025, cytotoxicity sensing using bio-reporting bacteria *Vibrio fischeri*- ISO 11348-3:2007, phytoplankton community composition based on chlorophyll pigments (chemotaxonomy), factorial analysis of phytoplankton DNA versus environmental parameters, pico-cyanobacteria subspecies exploration based on the diversity of 16SrDNA-ITS, Fluorescence Imaging & Flow-Cytometry for phytoplankton biomass evaluation.

Taking into consideration the fact that each of the methods presented above, via examples of their use in Albanian water bodies, provide information on different categories of parameters and indicators of the quality of water, and that biosensors show the cumulative impact of them on the microbiota, and this way could be helpful to predict the future of water systems, we suggest the employment of integrated approaches as the right choice.