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Assessment of Eutrophication Quality in Greek Coastal Ecosystem (Eastern Mediterranean Sea)

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The Mediterranean Sea has always been considered as one of the most oligotrophic areas in the world, especially in the Eastern part of the Sea. However, eutrophication problems occur in some coastal areas of the Mediterranean (e.g. eastern coasts of Spain, Gulf of Lions, northern Adriatic Sea, Apulian coasts, Saronikos Gulf, Thessaloniki Bay, northern coasts of Greece, etc.).
This work is focused on the assessment of the Eutrophication Quality in different coastal areas of Greece affected by various anthropogenic and natural pressures and was performed under the Water Framework Directive. A network of 28 sampling stations was used during two relevant sampling periods, April – May 2012 and March – April 2013, in the framework of the National Monitoring Project of Greece. The Eutrophication assessment method integrates chemical and biological parameters of the water column. A synthetic Eutrophication Index (E.I.) was produced for the greek coastal areas by Primpas et al. quality classification scheme, combining the concentrations of nutrients (phosphate, nitrate, nitrite, ammonia) and chlorophyll-α biomass into a single formula. The E.I. assesses the eutrophication status using a five scale scheme according to the requirements of WFD: (High) less than 0.04; (Good) 0.04-0.38; (moderate) 0.38-0.85; (poor) 0.85-1.51; (bad) >1.51.
Nutrient and chlorophyll-a concentrations revealed significant spatial variation among the various coastal areas of Greece influenced by different point and/or diffuse anthropogenic pressures (related to nutrient enrichment), reflecting the level of human-induced impairment where an increase in nutrient loads leads to increased water quality problems. The assessment of E.I showed that during 2012, 32% of the selected coastal areas were characterized as Good, 54% as Moderate and 14% of the selected greek coastal areas were characterized as Poor. During 2012, none of the study areas corresponded to High or Bad eutrophication status. During 2013, 29% of the study areas were classified as Good, 54% as Moderate, 11% as Poor and 7% as Bad. Three areas were upgraded in 2013, whereas four areas showed water quality degradation. Semi-enclosed coastal areas and areas affected by riverine inputs revealed Poor or Bad eutrophication status.
A statistical approach was applied to compare the eutrophication status of the study coastal areas for the two sampling periods (April – May 2012 and March – April 2013) showing statistically insignificant changes in the eutrophication status (increase of E.I) of the greek coastal areas after one year.