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A NOVEL AUTOMATED METHODOLOGY FOR THE COASTAL EUTROPHICATION INDEX ESTIMATION OF THE SUSTAINABLE DEVELOPEMENT GOAL 14 USING THE COPERNICUS MARINE ENVIRONMENT MONITORING SERVICE (CMEMS)

Abstract

The aim of the SDGs leans on the sustainability of human activities and the environment. The SDG 14 "Oceans" targets at the stability and sustainability of marine ecosystems and their resources. To quantify its first target, which refers to the prevention and the significant reduction of marine pollution of all kinds, 14.1.1 "Index of Coastal Eutrophication (ICEP) and Floating Plastic Debris Density" is introduced by UNEP. Currently, it is classified in Tier III, which means that the type of information needed is already defined, whereas the methodology and data sources for its estimation are not. It is composed of two sub-indicators: a. coastal eutrophication, and b. concentration of floating plastic. According to the Oslo-Paris Convention, "eutrophication means the enrichment of water by nutrients causing an accelerated growth of algae and higher forms of plant life...". The importance of this sub-indicator can be tracked as social, e.g. water areas dangerous for health and economic, e.g. fish/mussels die resulting to production losses, while it has also legislative support (Marine Strategy Framework Directive). Currently, an indirect method is proposed with the use of EO techniques, which is widely used for the estimation of eutrophication: the calculation of chlorophyll-a concentration. In this paper, an integration of several eutrophication indicators is proposed. Moreover, eutrophic areas are usually detected in coastal waters due to nutrient inputs from anthropogenic coastal and land activities. CMEMS uses EO data and in-situ measurements to model these types of information. In this paper we present a novel automatic methodology for the Index of Coastal Eutrophication estimation in the regions of Iberia-Biscay-Ireland Seas with the use of EO data. The algorithm exploits CMEMS models of Phosphate-Nitrates-Silica nutrients, Chlorophyll-a and Water Transparency and computes a weighted indicator that segments waterbodies into four categories: non-problematic areas, tendency for eutrophication events, possibility of eutrophication events and problematic areas. The indicator is calculated with respect to the Contiguous Zones (24nm from the coast), as determined by the United Nations Convention on the Law of the Sea (UNCLOS), and the bathymetry of the countries that are included in the region of interest. The temporal suggested provision is weekly and monthly, aggregated from daily CMEMS products. Results indicate each country's percentile distribution (