

EUTROPHICATION ASSESSMENT AND MANAGEMENT

Robert Precali^{1*}

¹ Ruder Bošković Institute Center for Marine Research - precali@cim.irb.hr

Abstract

For the eutrophication assessment and management purpose a simple approach that can be applied to a station, area or region was designed.

Keywords: Eutrophication, North Adriatic Sea

For the eutrophication assessment purpose a simple approach that can be applied to a station, area or region was designed and it is now part of the Croatian national legislation [1]. Here we will only discuss it at the station level. It consists of two parts a) the annual station eutrophication profile and b) the station eutrophication profile. All the threshold from the national classification scheme [2] is plotted on the eutrophication profiles to simplify the assessment.

The annual station eutrophication profile shows us the development of the main eutrophication components (pressure – nutrients levels – total dissolved inorganic nitrogen, orthophosphate and orthosilicate concentration in the water column; state or effect – dissolved oxygen and chlorophyll *a* concentration in the water column; and the N/P ratio that indicate the limitation of one of the nutrient component) through the year. From this the change of the eutrophication components can be assessed for a particular year.

The station eutrophication profile is the representation (Box and Whisker) of historical data of the main eutrophication components (trophic index, concentration of chlorophyll *a*, total inorganic nitrogen, total phosphorus, oxygen saturation and the ratio between total inorganic nitrogen and orthophosphate - N/P) at a certain station. A simple classification scheme is (Tab. 1) maintained and the status for a single component on the basis of the national classification scheme assessed as the ongoing trends to. The assessment criteria are under development and will be implemented with in mind the management purpose.

Tab. 1. Station eutrophication profile, with an assessment of trends and ecological status for station SJ107 situated 13 Nm off Rovinj in Croatia.

Parameter	Status description	Trend (10 a)	Status
Trophic index	Systematically in the range for oligotrophic coastal sea	absent	very good
c(Chla)	Significant variability in the limits for oligotrophic coastal sea	absent	very good
O ₂ /O ₂ '	Significant variability in the limits for oligotrophic coastal sea	absent	very good
c(Tini)	Significant variability in the limits for oligotrophic coastal sea	absent	very good
C(TP)	Significant variability in the limits for oligotrophic coastal sea	absent	very good
N/P	Significant variability in the limits for oligotrophic coastal sea, increasing trend in the last 10 years	increasing	

An example for the approach is presented on Fig. 1 for station SJ107 situated 13 Nm off Rovinj in Croatia.

Moreover, the station eutrophication profile allows us the management of the mitigation measures through the identification of changes in the main components of eutrophication. It is also important to design a robust classification scheme with a well-defined pressure to response relationship. Both profiles are open to the integration of new indicators as they emerge, specifically in the biodiversity field.

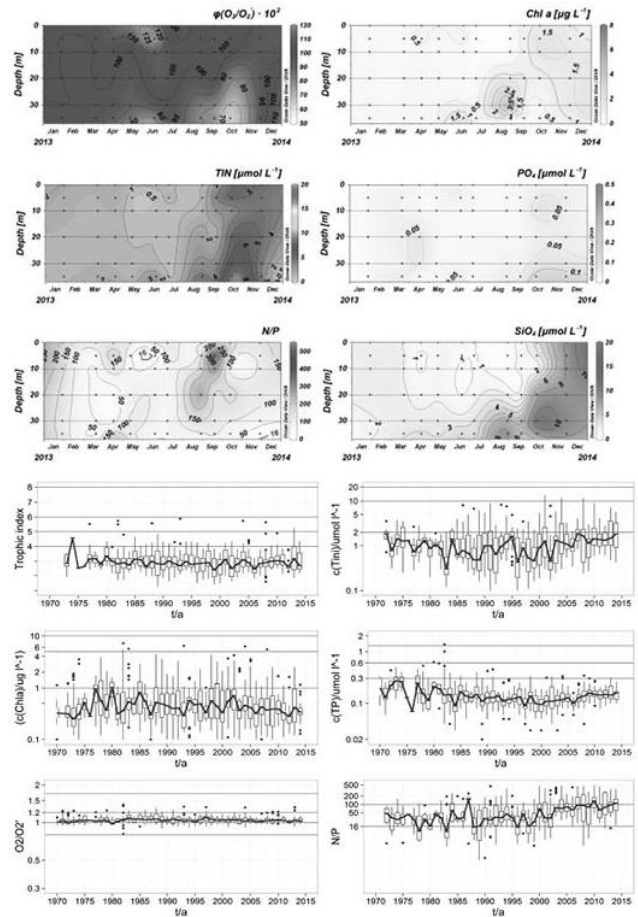


Fig. 1. Top: Annual station eutrophication profile - the distribution of oxygen saturation ($\phi(O_2/O_2')$), concentration of chlorophyll *a* (Chl *a*), total dissolved inorganic nitrogen (TIN), orthophosphate (PO_4) and orthosilicate (SiO_4), and the ratio of N/P with depth at station SJ107 (13 Nm W off Rovinj) during 2013. Bottom: Box and Whisker representation of trophic index, concentration (*c*) of chlorophyll *a*, total inorganic nitrogen (Tini), total phosphorus (TP), oxygen saturation (O_2/O_2') and the ratio between total inorganic nitrogen and orthophosphate (N/P) for the period 1970-2014 at station SJ107. Limits of classifications are from the Regulation on water quality standards [2].

References

- 1 - Decision on the adoption of the Coastal and Marine Management Strategy Action Programme: Monitoring and observation system for continuous assessment of the state of the Adriatic Sea, Official Gazette RH 153/14
- 2 - The Decree on Water Quality Standards (Official Gazette RH 73/2013, 151/2014 and 78/2015)