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Assessment of the ecological status of Algerian coastal water: recommendations and proposal

Corresponding Author : Benkhedda Belhaouari[1*], Ahmed Belguermi[2]

1 Biotechnology laboratory applied to agriculture and environmental preservation, Higher School of Agronomy of Mostaganem -Algeria

2 Environmental Monitoring Network Laboratory, University of Oran 1 -Ahmed Ben Bella- Algeria

* belhaouaribio@hotmail.fr

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Abstract

Anthropogenic pressures on Algerian coast are increasing every year. The assessment of the status of coastal waters in Algeria faces major challenges, so Algeria should have a modern coastal monitoring system. The environmental assessment of the coastal waters quality in Algeria shouldn't be based only on physicochemical analysis, but we must also use the European model. The evaluation of biological, physic chemical and hydromorphological water quality must be adapted to the Algerian context. In this paper we briefly describe the major points to be realized to determine the real state of Algerian coastal waters. We recommend using several monitoring systems and we propose some recommendations for the best assessment of the ecological status of Algerian coastal water. This will be helping the development of a Coastal Monitoring System in Algeria.

Keywords: ecological status, marine pollution, water bodies, algerian coastal

1. Introduction

The Algerian coastline is 1,622 km long. The estimated population was 41 million concentrated near 40% in the 14 coastal cities. The Algerian coast is highly anthropized. The dumping of chemical and organic pollutants in coastal waters is considerable [1-2]. The issues related to marine pollution are important. The poor quality of coastal water harms the biodiversity and can even cause the extinction of

the most sensitive species. All uses of water and these environments are likely to be affected by a poor environmental condition. In general, the assessment of the state of coastal waters in Algeria is based on physico chemical analyzes and the measurement of the presence of certain pollutants. Coastal water monitoring should not be limited to the assessment of chemical contamination of the water but also all of the ecological status [3-4-5]. The ecological status of natural surface water bodies is considered to be an integral part of the quality of coastal waters. In recent years, methods for assessing the quality of coastal waters have evolved considerably. The general state of a coastal water body is determined by the lowest value of its ecological status and its chemical status. The definition of good chemical status of a body of water is based on compliance with limit values, but the assessment of ecological status is complex [6].

According to the water framework directive (2000) of the European Parliament, to define the ecological status of a body of water, it is necessary to aggregate the biological quality, reflecting the proper functioning of the aquatic flora and fauna, with the physicochemical quality and hydromorphological quality which are considered to be the supports for the proper functioning of aquatic flora and fauna [7]. This paper proposes some recommendations for assessment of the ecological status of Algerian coastal water.

2. Materials and methods

The assessment of the state of coastal and transitional waters in Algeria is characterized by the absence of a standardized methodology used systematically by ONEDD (National Observatory for the Environment and Sustainable Development) and its partners [8-9-10].

In Europe, the rules for assessing the status of surface water have been determined by the Water Framework Directive (WFD). To define the ecological status of surface water, it is necessary to evaluate the biological, physico-chemical and hydromorphological quality. The rule of aggregation of quality elements, to establish the ecological status is that of the most downgrading element.

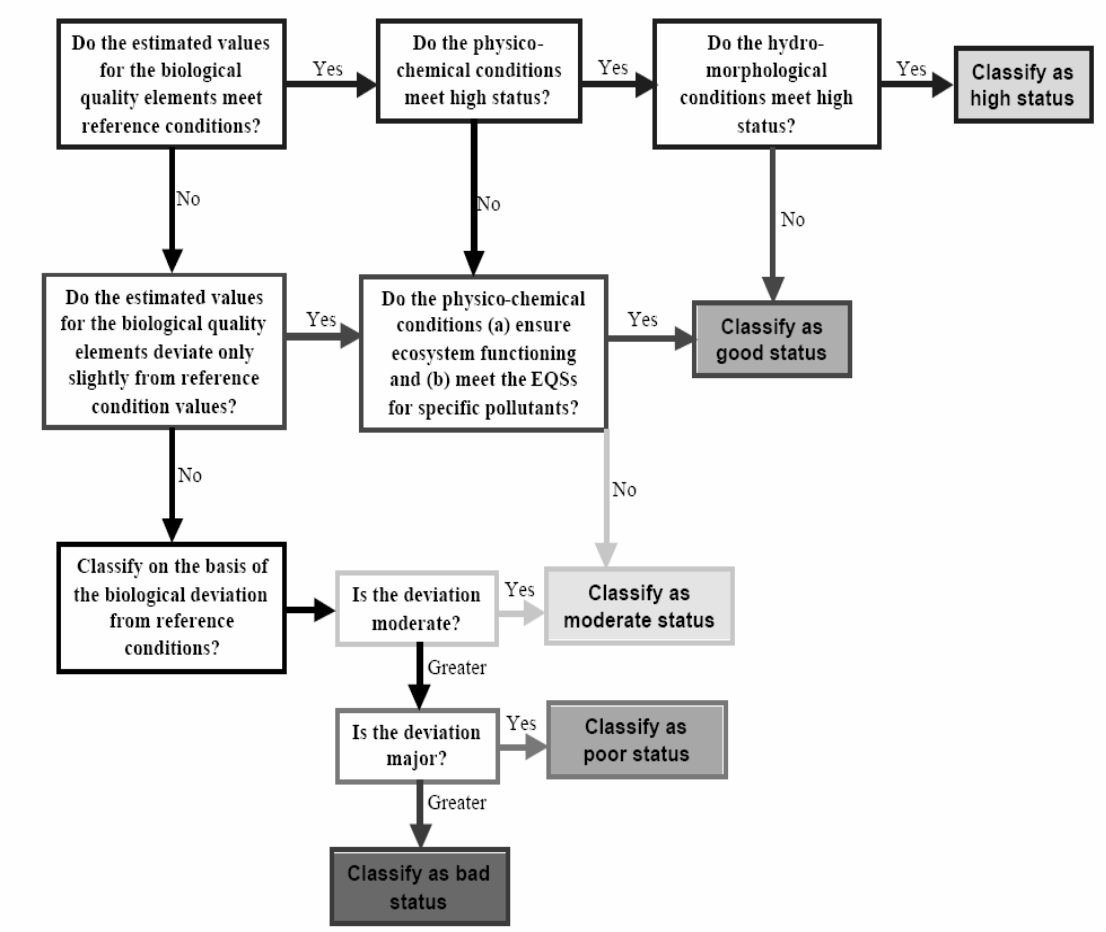

Figure 1 : Indication of Relative Roles of Biological, Hydro-morphological and Physico-chemical Quality Elements in the Ecological Status Classification [11]

3. Results and discussion

In Algeria, the assessment of the ecological status of coastal waters can be carried out by drawing on the European method. We recommend a gradual implementation of methods for assessing the ecological status of coastal waters. You cannot apply the whole of the European method in the first year.

1- Firstly, a distinction must be made between coastal water bodies and transitional water bodies. Salinity can be used to set the limit between coastal waters and transitional waters. A threshold of 25 psu is proposed.

2- The elements of biological quality are macroalgae, angiosperms, invertebrates and phytoplankton. For each element of biological quality, we recommend the use of an index (Table 1).

Table 1 : List of recommended biological quality indices

biological quality element	Index	Reference
Macroalgae	Ecological Evaluation Index continuous formula (EEI-c)	[12]
Angiosperms	Biotic index using the seagrass *Posidonia oceanica* (BiPo)	[13]
Invertebrates	Indices based on benthic macroinvertebrate communities (BENTIX)	[14]
Phytoplankton	Indicative parameter of biomass (chlorophyll a)	[15]

The classification of a biological quality element is carried out on the basis of a deviation from the reference conditions in which the body of water should be found, apart from any anthropogenic impact [3-4-16]. These conditions may be set according to four options defined by the WFD: spatially based, historical data, modelling, or expert judgement [6-7]. EEI-c, BiPo, BENTIX and chlorophylle a indices have set reference conditions using a combination of spatial data and modelling.

3- The physico chemical elements evaluated are temperature, dissolved oxygen, nutrients, salinity and turbidity. These parameters are achievable and European limit values can be used [17].

For European countries, the assessment of physico chemical elements also takes into account a list of specific pollutants. Each country following the WFD can select a chemical pollutant (zinc or copper, for example), if it observes a high use of this pollutant. The pollutants selected will be considered as specific to this country. They are not on the European list of chemical pollutants approved by the European Parliament. In Algeria, it is not essential to establish a list of specific pollutants, because all

dangerous chemical pollutants will be taken into a list of pollutants will be used for the assessment of the chemical status.

4- The hydromorphological elements are the variations in depth, the structure and substrate of the coast as well as the structure of the intertidal zone [18].

In a first step of applying the European method, hydromorphology is not taken into account. Thus the objective of the assessment of ecological status is limited to achieving a good status (figure 1).

5- A monitoring program for the ecological status of surface water must be defined, specifying the monitoring methods, the location of monitoring sites, the frequencies of analysis and the means provided for carrying out the monitoring.

6- At the level of each department, a map must be produced which makes it possible to synthesize the ecological status of coastal waters.

4. Conclusion

A systematic surveillance covering all Algerian coastal waters must be applied. Algeria must initiate a network bringing together the scientific and technical skills of several institutions. We recommend to draw inspiration from the European model to get a clearer idea of the general status of Algerian coastal waters. In a first version of the Algerian monitoring system can be limited to the evaluation of the physico chemical and biological quality of coastal waters to monitor their ecological status.

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