

Ecological Quality Status of coastal waters - GR

1. Policy Objective & Theme

- SUSTAINABLE USE OF RESOURCES: Preserving coastal environment (its functioning and integrity) to share space

2. Key Approaches

- Knowledge-based

3. Experiences that can be exchanged

The ecological quality status of coastal areas in the Aegean Sea (Greece, Eastern Mediterranean) was assessed, based on the benthic macro-invertebrate quality element. Various indices were also applied and evaluated comparatively. Faunistic data were also used to interpret results. The resulting classification was validated with the use of physic-chemical parameters and pressure information. This work also provides an insight into the structure of the Bentix classification scheme within the scope of the implementation of the Water Framework Directive (WFD).

4. Overview of the case

Various national methods for classification of ecological status have been developed, but all have to be inter-calibrated in order to reach a common basis on the interpretation of the ecological status. . For the biological quality element of macro-invertebrates recent indices and classification schemes have been used. Such indices are based on the concept of indicator species and subjectively classify species into various ecological groups based on the international literature and experience. Two areas (S. Evvoikos gulf and Thessaloniki gulf) were selected on the basis of the known pressures imposed on the environment and estimated as covering the whole range from high to moderate status.

5. Context and Objectives

a) Context

Thessaloniki Gulf (N. Aegean Sea, eastern Mediterranean) is a eutrophic, enclosed gulf, with reduced water flux, receiving high nutrient inputs from rivers, urban and industrial runoff, while the shellfish farming activity reaches about 85% of the total Greek production. In Thessaloniki gulf, the main pressures include the urban and industrial wastes of Thessaloniki urban area that are collected and discharged after partial treatment in two sites of Thessaloniki gulf. The gulf also receives agricultural wastes from a wide drainage area transported by the rivers. Organic pollution from urban and agricultural wastes discharged in the enclosed Thessaloniki bay results in eutrophication and consequently in the degradation of the benthic element. The impact on the ecological quality is more prominent in the enclosed bay of Thessaloniki decreasing towards the opening of the gulf.

The second set of study stations was selected in the periphery of Attiki located mostly in S. Evvoikos gulf (Marathon, Porto Rafti, Keratea) while some of the stations around the turn of Attiki are located in Saronikos Gulf (Anavissos, Saronida, Agia Marina). The area, referred to as S. Evvoikos gulf, is a wide area directly open to the South Aegean Sea, which presents the sedimentological properties of open seas. The anthropogenic impact from land-based sources in the gulf originates from a number of coastal towns, ports and summer resorts, which are scattered along the coasts of the periphery of Attiki. Other sources of environmental disturbance in the area include small scale fisheries. S. Evvoikos coastal area is slightly affected by minor pressures including tourist activities and small scale fisheries. The two gulfs under study have different characteristics concerning the physical and biological conditions. Regarding the typological characterization of water bodies according to the WFD guidelines . S. Evvoikos gulf is characterized as a rocky deep exposed gulf with a depth ranging from 32 to 70 m while Thessaloniki gulf (6–19 m) as a sedimentary shallow sheltered gulf with the inner parts bearing characteristics of very

sheltered bays.

b) Objectives

The ecological quality status of Greek coastal areas in the Aegean Sea was assessed, based on the benthic macro-invertebrate quality element. The biotic index Bentix, developed for the assessment of the ecological status, was tested. The index renders a five step numerical scheme for the classification of benthic communities into five ecological quality classes according to the requirements of the WFD. Other ecological indicators, such as the Shannon diversity index (H), the species richness (S) and the AMBI biotic index were also applied and comparatively evaluated. Faunistic data were also used to interpret results. The resulting classification was validated with the use of physic-chemical parameters and pressure information.

6. Implementation of the ICZM Approach (i.e. management, tools, resources)

a) Management

The methodology and the case presented are developed by a research team of the Hellenic Centre of Marine Research (HCMR), Athens, Greece.

b) ICZM Tools

Benthic samples were collected from 14 stations located in S. Evvoikos gulf around Attica and from 6 stations located in the Gulf of Thessaloniki. Samples from S. Evvoikos gulf were collected during a summer sampling trip in July 1996 using a Van Veen 0.1 m² grab taking two replicates at each station and in Thessaloniki gulf samples were collected in December 2002 using a Ponar 0.045 m² grab sampling three replicates at each station. Samples were sieved on board with a 1 mm mesh size sieve, preserved in 4% formalin solution in water and sorted in the laboratory. Benthic species were identified to species level where possible. The chemical parameters correlated included organic carbon content in sediment, dissolved oxygen in the water column, oxygen in the bottom layer, nitrates and phosphates. Chemical data were integrated as average annual values.

7. Cost and resources

The means and framework for acquiring the data used in this work were provided through HCMR regional and EU FATE PROJECT, 2005: contract EVK3-CT01-00055.

8. Effectiveness (i.e. were the foreseen goals/objectives of the work reached?)

Biotic indices, such as BENTIX and AMBI, based on the ecological grouping of species, are generally considered as a promising approach for ecological quality assessment in order to avoid drawbacks due to the seasonal variability of the benthic communities and dependence from other factors.

9. Success and Fail factors

The method has been tested successfully in a variety of Eastern Mediterranean (Greece, Cyprus and Turkey) benthic ecosystems and in case areas subject to organic pollution, such as the Athens or Saronikos gulf, the Izmir Bay, to oil spills accidents, to industrial solid wastes discharge area and to fish culture areas. It has been also tested successfully in 70% of cases in the Sea of Marmara, a basin connecting the Black Sea and the Mediterranean Sea and receiving a large number of wastewater discharges from land-based sources.

10. Unforeseen outcomes

None

11. Prepared by

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12. Verified by

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13. Sources

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