# Posidonia oceanica ecosystems in Greek coasts - GR

## 1. Policy Objective & Theme

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

## 2. Key Approaches

- Knowledge-based
- Ecosystems based approach

## 3. Experiences that can be exchanged

The study shows that Posidonia oceanica meadows could be used in Greece as Biological Quality Element (BQE), according to the Water Framework Directive (WFD) and proposes reference (undisturbed) conditions values, for the following parameters (metrics): lower depth limit of P. oceanica meadow, shoot density (at 5 and 15 meters depth) and leaf biometry (expressed as leaf surface per shoot).

## 4. Overview of the case

Based on samplings from 14 sites, a setting of class boundaries is proposed for the Aegean Sea under reference conditions: (a) the lower depth limit of P. oceanica meadow lies at 30-35 m depth, (b) the shoot density at 5 and at 15 m depth is 610.44 ±98.80 shoots/m2 and 517.5±78.86 shoots/m2 respectively, and (c) the maximum leaf surface per shoot at 5 and at 15 meters depth is 350 cm2 and 250 cm2 respectively. The high/good class boundary is proposed to be set at 35% deviations from the reference conditions values and the good/moderate class boundary at 50% deviations from the reference conditions values. No data were available for moderate/low class boundary while the poor class is characterized by the absence of P. oceanica meadow due to human activity.

## 5. Context and Objectives

### a) Context

The ecological status of a water body is an overall expression of the structure and function of the biological community living in it, taking into account natural physiographic, geographical and climatic factors as well as physical and chemical conditions, including these resulting from human activities. The European Union has adopted the concept of ecological quality of the surface waters in the Water Framework Directive (WFD) by using biological communities as Biological Quality Elements (BQE's) for the evaluation of the Ecological Status (ES). The innovative approach of the WFD includes the establishment of Reference Conditions (RC) and Ecological Status Class (ESC) boundaries by using indicative parameters or metrics (preferably in numbers) of different QE. For the case of coastal waters the BQE's are the phytoplankton, the zoo-benthos and the phyto-benthos (EC 2000). The ESC is used in order to describe the degree of human impact on the biological communities living in a water body.

Five classes of quality (high, good, moderate, low and bad) are foreseen in the WFD, the high class reflecting the RC. For the EU Member States the goal is to reach the "good" status for all surface water bodies by the year 2015. Therefore, monitoring data and predictive modelling is needed. The definitions of RC and ESC boundaries have been discussed within the context of the WFD and these principals and methods taken into account in the present study. Among the European scientific community, a large number of researchers have invested a great effort in finding new biotic indexes based on the proposed BQEs. Some examples that reflect this tendency are the biotic indexes AMBI and BENTIX for invertebrates of soft-bottom substrate, Ecological Evaluation Index  for macro-algal communities and the index for the marine angiosperm Zostera marina.

The marine angiosperm meadows (sea grasses) are proposed in the WFD as BQE because they are a common habitat type along European coastlines and constitute one of the key groups of phyto-benthos. The sea grasses as perennial sessile organisms respond directly to the abiotic and biotic aquatic environment and thus represent sensitive indicators of its changes. A typical example of a marine angiosperm is the Mediterranean endemic species, P. Oceanic which have efficiently been used as a BQE involving a large number of metrics (leave surface, shoot density, N & P concentrations).

### b) Objectives

The objective of the study was to use P. oceanica meadows in Greece as a Biological Quality Element (BQE), according to the WFD and to propose reference (undisturbed) condition values, for the following parameters (metrics): lower depth limit of P. oceanica meadow, shoot density (at 5 and 15 meters depth) and leaf biometry (expressed as leaf surface per shoot).

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

### a) Management

The monitoring programmes, since 1990, were undertaken by a research team of the Hellenic Centre for Marine Research (HCMR).

### b) ICZM Tools

Data were collected during the last two decades from 14 sites in the South Aegean Sea. At each site, sampling was carried out by SCUBA diving. After a visual approach of the meadow, which allowed direct estimations of its topography, the meadow density (number of shoots per quadrat) was measured in several quadrats of a 20x20cm at different depths between 5-15 meters. Finally, all the shoots from some quadrats were collected and further processed in the laboratory. In total 40 quadrats have been sampled from 5 to 15 meters depth. In the laboratory, leaves were removed from each shoot and separated into adult, intermediate and juveniles. The length and width of all leaves was measured using a standard protocol. Based on the length and width of leaves, the leave surface per shoot has been calculated.

## 7. Cost and resources

The monitoring programmes have been funded by the Ministry of Environment, Spatial Planning and Public Works of Greece (national funds).

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

The monitoring programme and the collection of data could have been performed with more advanced techniques (e.g. submerged video camera) and hence increasing the number of study sites and the database.

## 9. Success and Fail factors

The programme was successful in providing the required results (values) for P. oceanica meadows in the Greek seas and hence in assessing their ecological quality.

## 10. Unforeseen outcomes

None

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## 13. Sources


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