MINISTRY OF DEVELOPMENT - GENERAL SECRETARIAT FOR RESEARCH AND TECHNOLOGY
H.C.M.R.
HELLENIC CENTRE FOR MARINE RESEARCH

Offshore renewable energy infrastructures in the framework of the **EU Maritime Policy**

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Why offshore?

Advantages

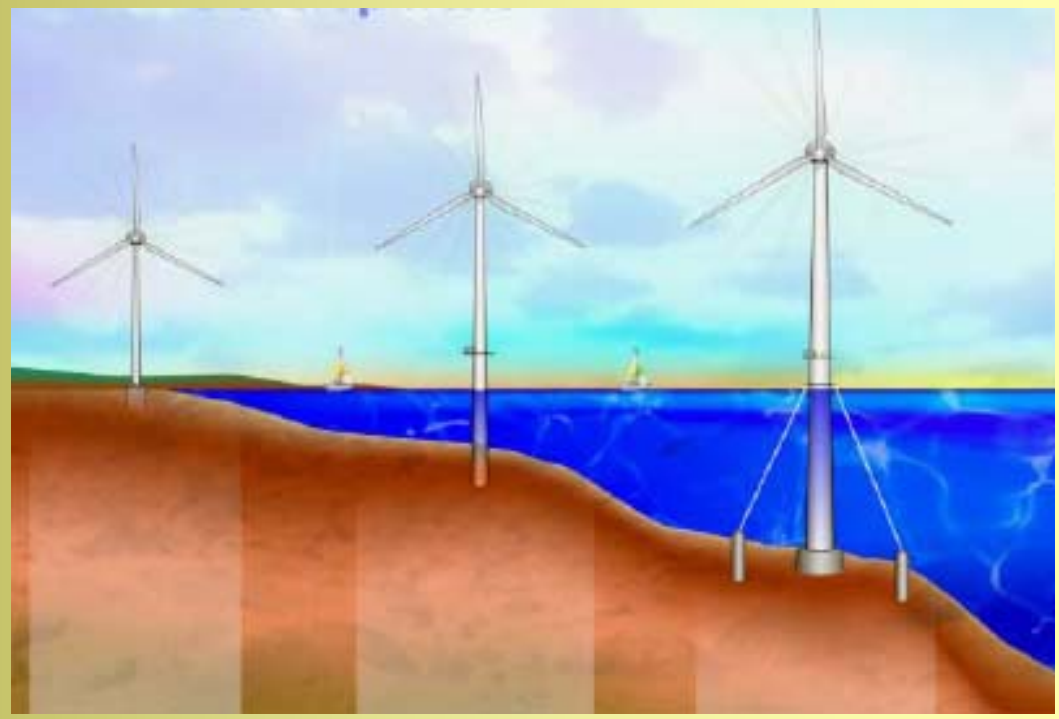
Wind and waves

Space

Precondition

Good Environmental

Status (GES)



GES of the European seas

The “Good Environment Status”
in terms of the Marine Strategy
Framework Directive (2008/56/EC):
A key issue for the **EU Maritime Policy**

Aim:

Maintain the capacity of the sea to provide goods and services

Why a EU Maritime Policy?

- Under the sovereignty of the European Union 27 Member States there is more sea (territorial waters + exclusive economic zone) than land surface.
- The European Union is a maritime superpower.
- The question is how ready Europe feels to manage its maritime welfare.

Major threats to the EU maritime welfare

Europe's oceans are facing a number of threats:

- loss or degradation of biodiversity
- loss of habitats
- nutrient input - eutrophication
- contamination by dangerous substances
- impacts of climate changes

The legal framework for a sustainable management of the EU maritime welfare

- Measures to control and reduce pressures and impacts on the marine environment do exist, but they have been developed in a sector by sector approach resulting in a patchwork of policies, legislation, programmes and actions plans.
- There is no doubt that the EU member states respect the international maritime low and also the EU Commission, as legal entity, has signed the international maritime conventions.

The legal framework for a sustainable management of the EU maritime welfare

On top of this some specific EU legislation take care about the sustainable management of the seas:

- the **Habitat Directive** (92/43/EEC) covers 9 important marine habitat types and
- the **Water Framework Directive** (2000/60/EC) clams for a “good ecological status” of all water bodies (limited to 1 nautical mile from the coast) at 2015.

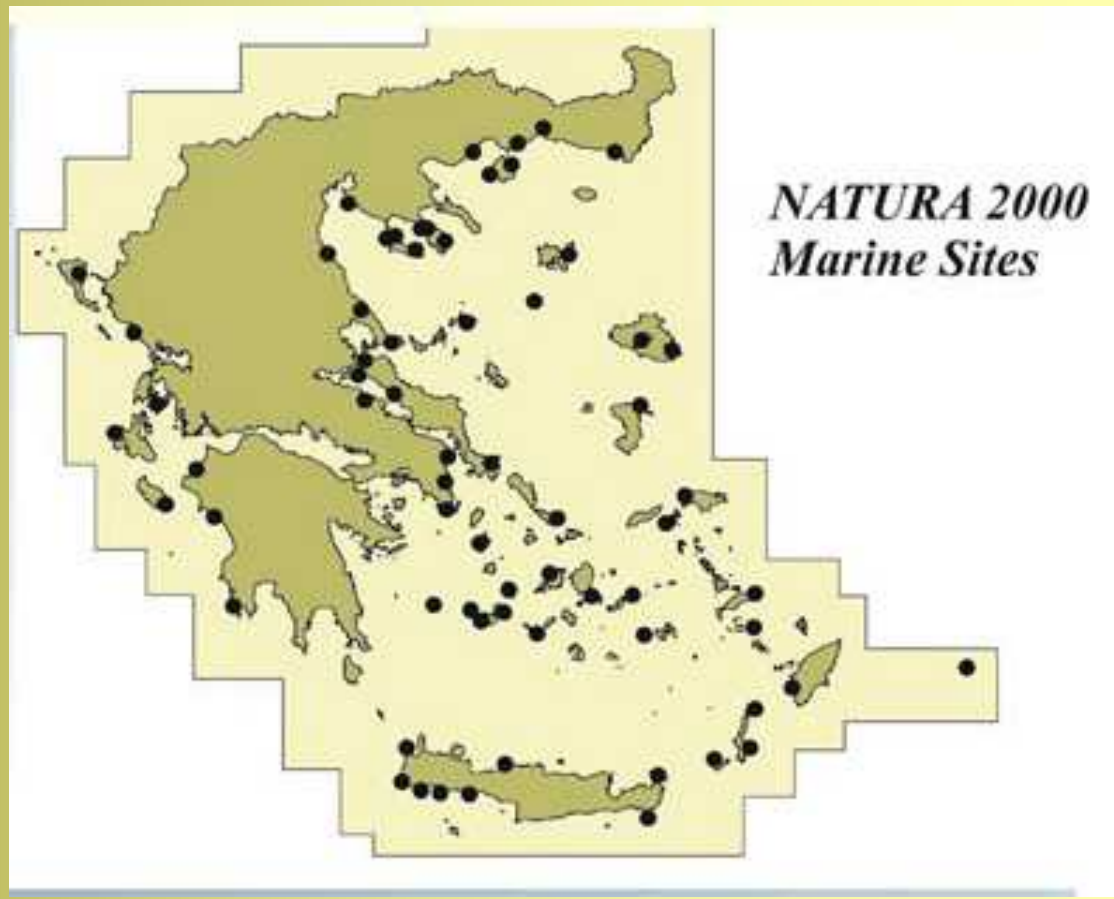
The “habitat” Directive (92/43/EEC)

- The Directive 92/43/EEC on the conservation of natural habitats and creation of the NATURA 2000 network, also known as “habitat” Directive, represents a step towards the protection of biotopes by European Law
- The Directive includes in its Annexes, among others, a list of sensitive aquatic biotopes (habitats) and threatened aquatic species of the European flora and fauna.
- The Directive suggests a rating system for the representativity of biotopes as well as of the conservation status.

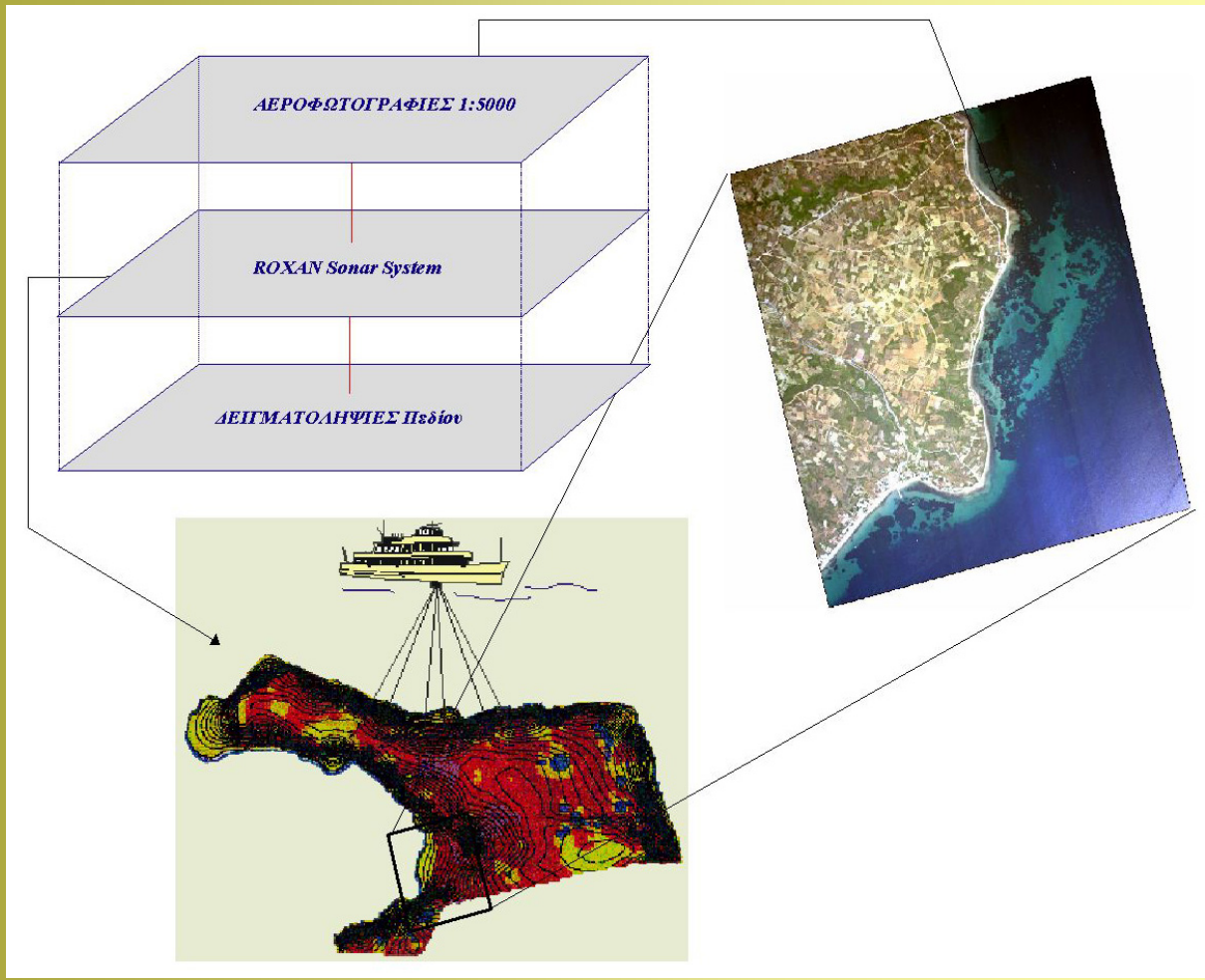
Implementation of the Habitat Directive in Greece

The institute of Oceanography coordinate the habitat mapping in 67 Natura sites

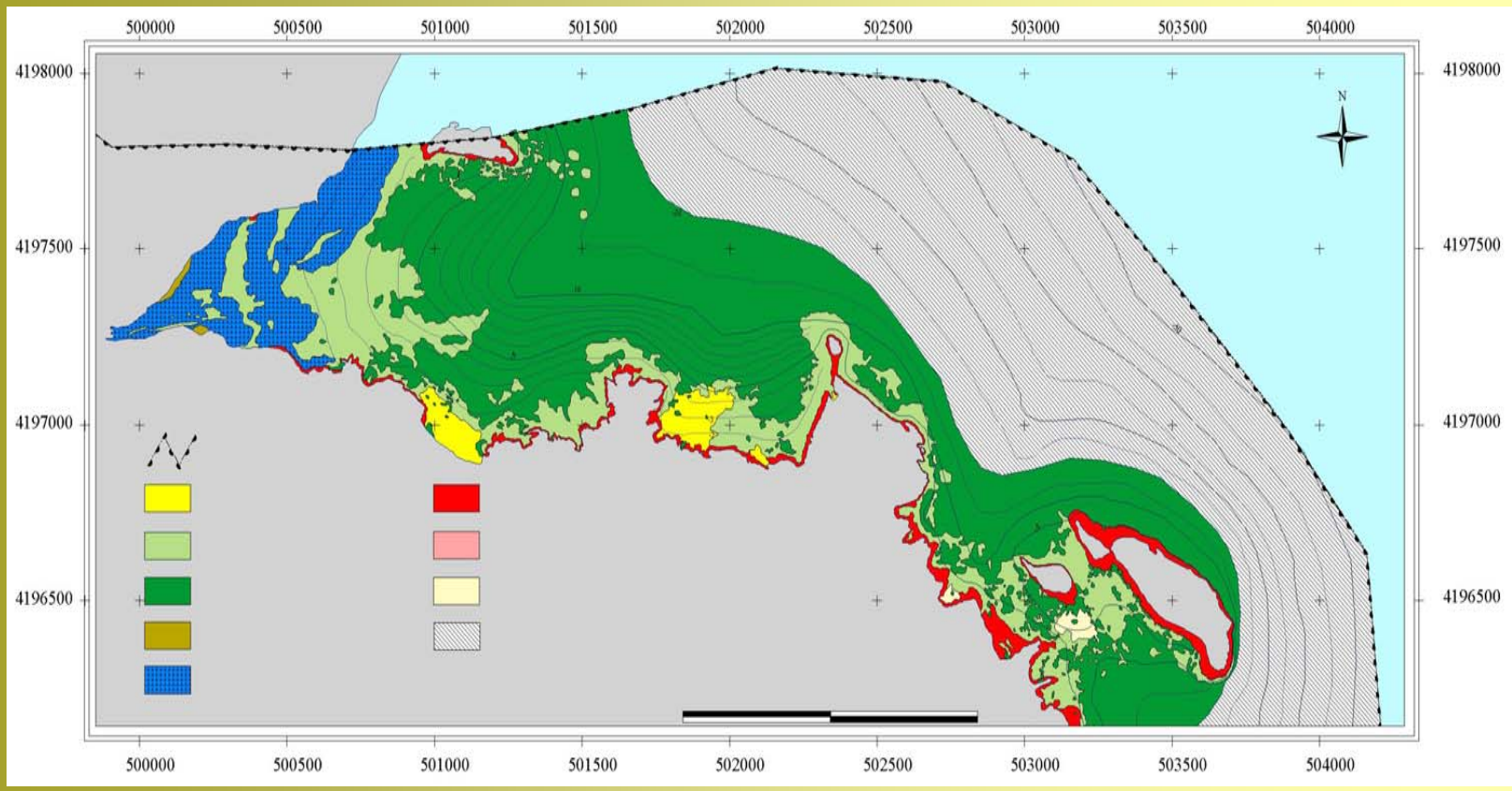
(1999-2001)

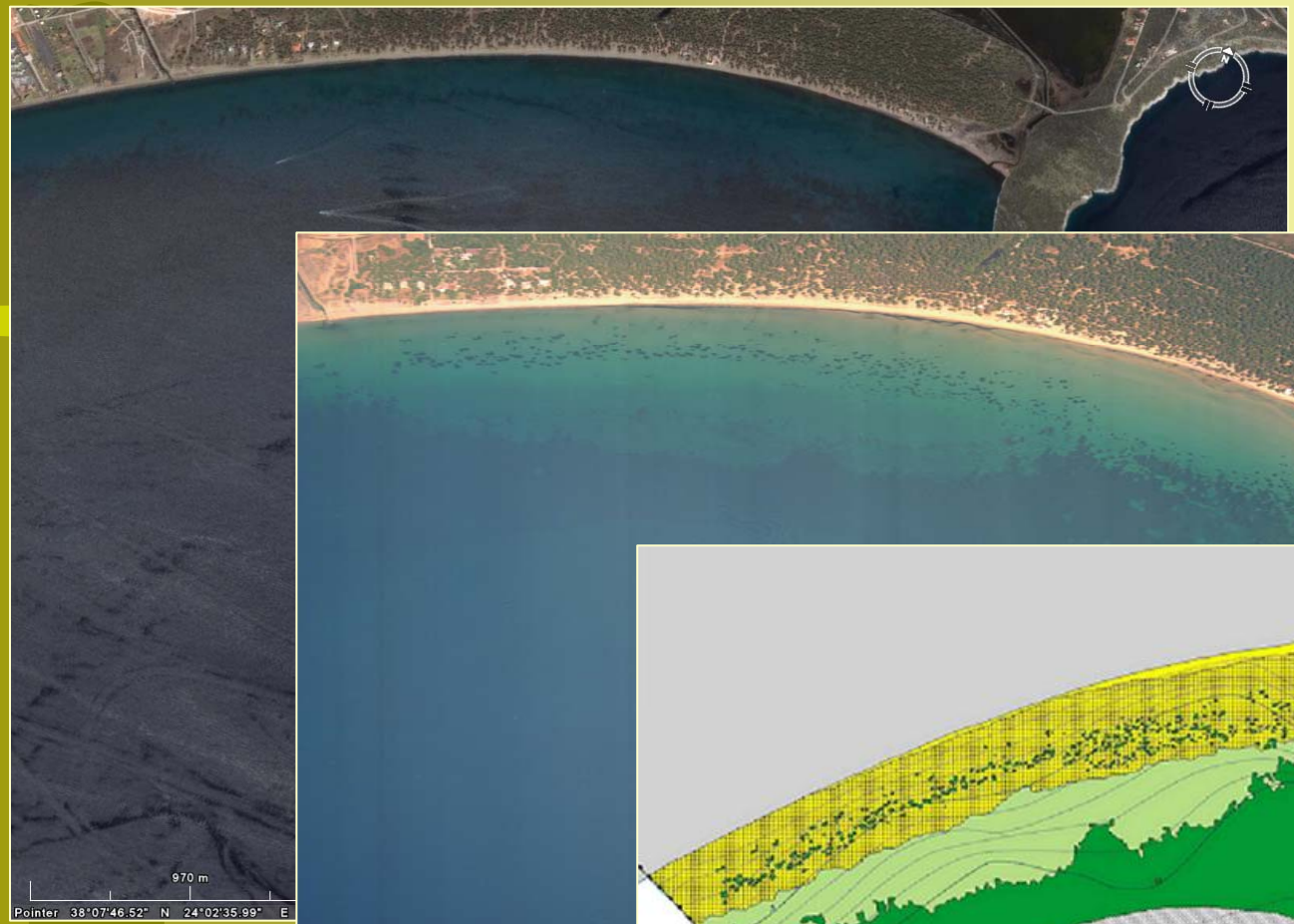


Methodology: remote sensing, eco - sounding and diving observations



Deliverables: habitat maps

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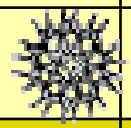
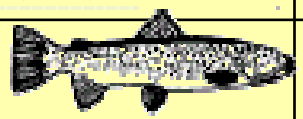
Pointer 38°07'46.52" N 24°02'35.99" E

The Water Framework Directive WFD (2000/60/EC)

- The Ecological Quality is an overall expression of the structure and function of the biological communities
- The final goal of the Water Framework Directive (2000/60/EC) is that Member States should achieve "good ecological and chemical status" for all waters by Dec 2015
- Ecological status is determined by biological quality elements (BQE)
- Hydromorphological and physico-chemical quality elements are also taken into account
- A consistent classification of all European surface waters into status classes is necessary

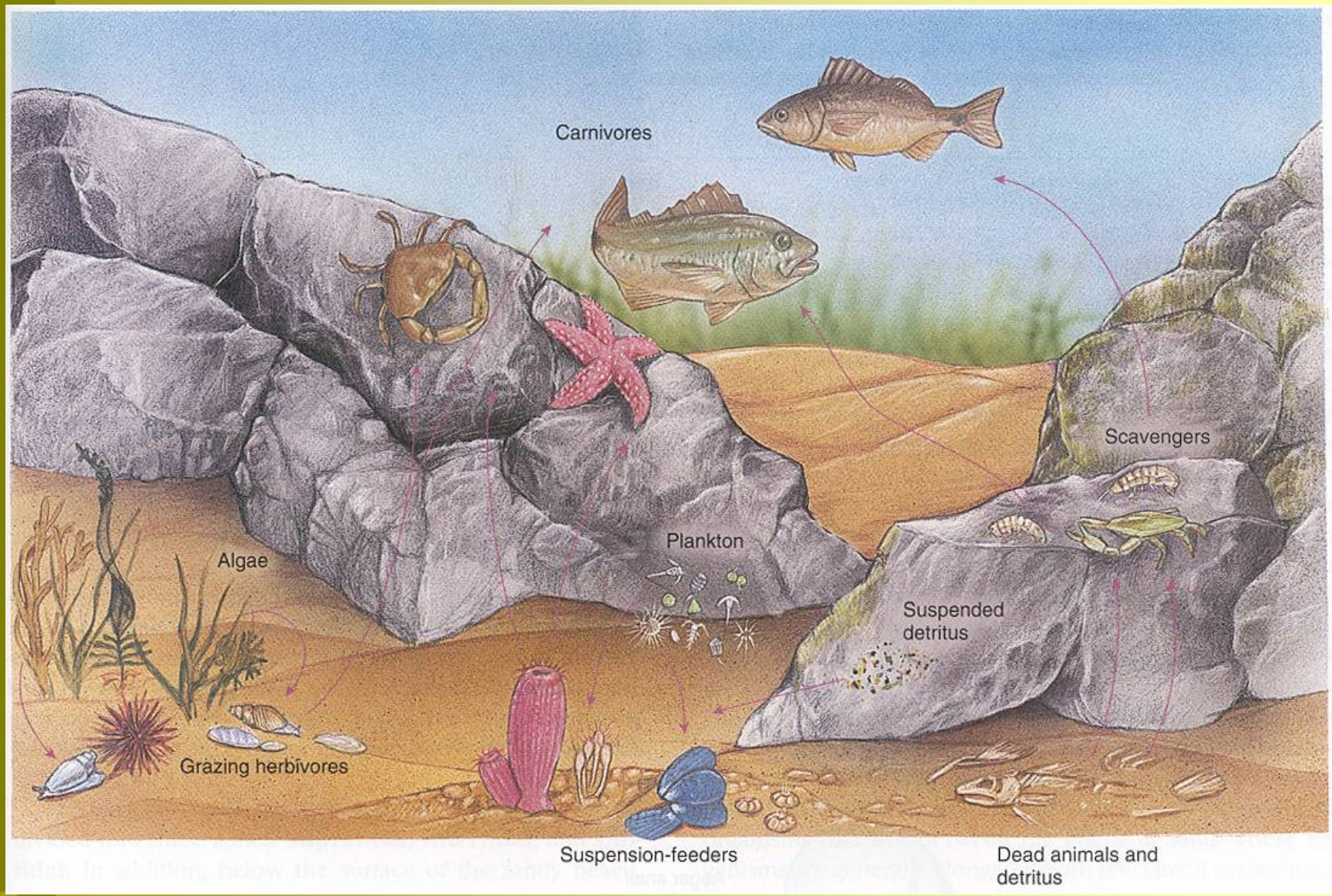
Classification criteria for biological elements
generally: taxonomic composition and abundance

Biological Quality Elements	Rivers	Lakes	Transitional waters	Coastal waters
Phytoplancton 	x	x	x	x
Macroalgae and Angiosperms 			x	x
Macrophytes and phytobenthos 	x	x		
Benthic invertebrate fauna 	x	x	x	x
Fish fauna 	x	x	x	

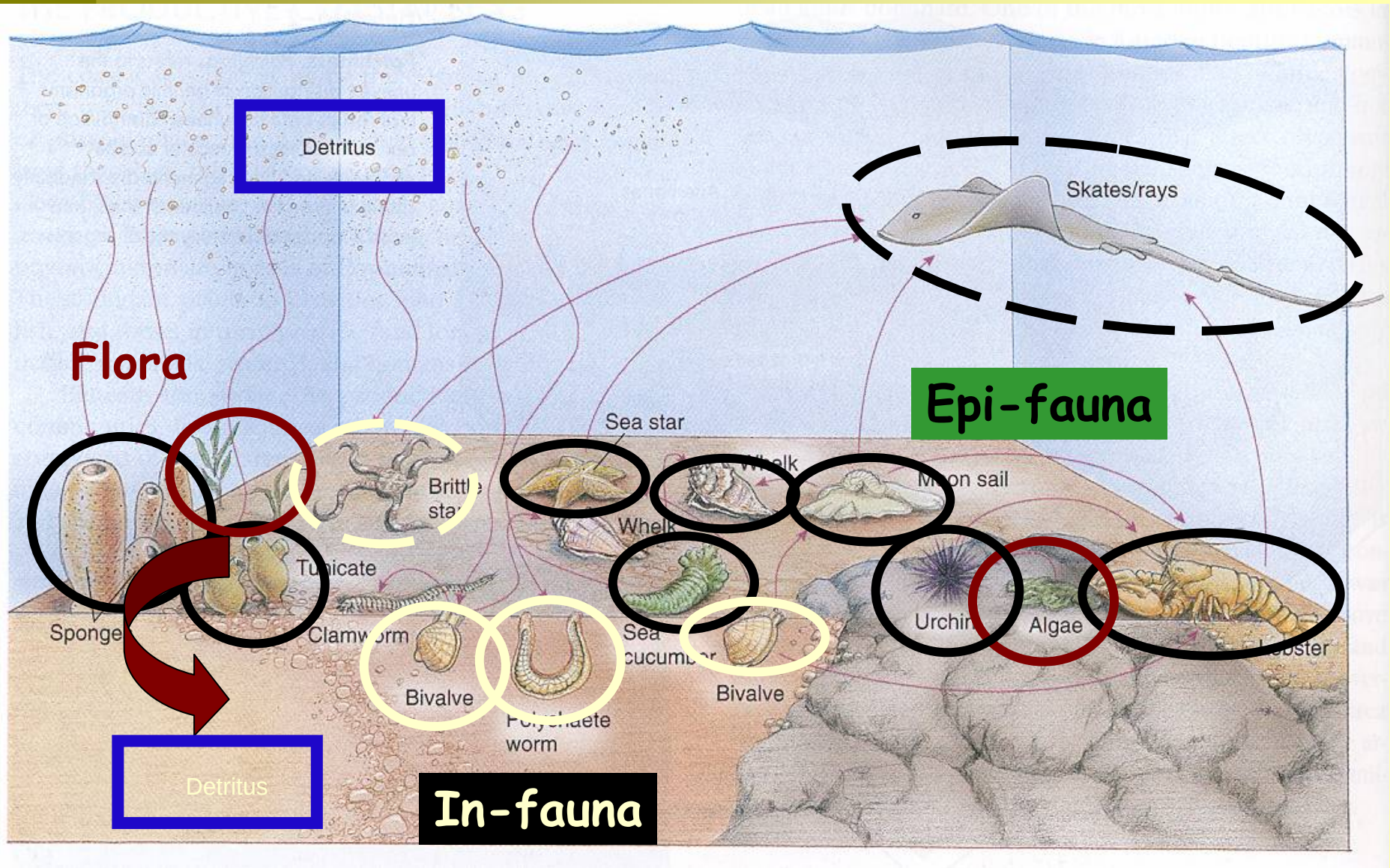
WFD - the normative classification can be summarized as:

- **high** = no disturbance in the structure and function of the communities, or only minor deviations from ***reference conditions***
- **good** = low levels of disturbance, but only slight deviations in the structure and function of the communities
- **moderate** = moderate deviations and significant effects
- **poor** = major biological alterations and substantial deviation
- **bad** = severe biological alterations and large deviation

A key issue: reference conditions



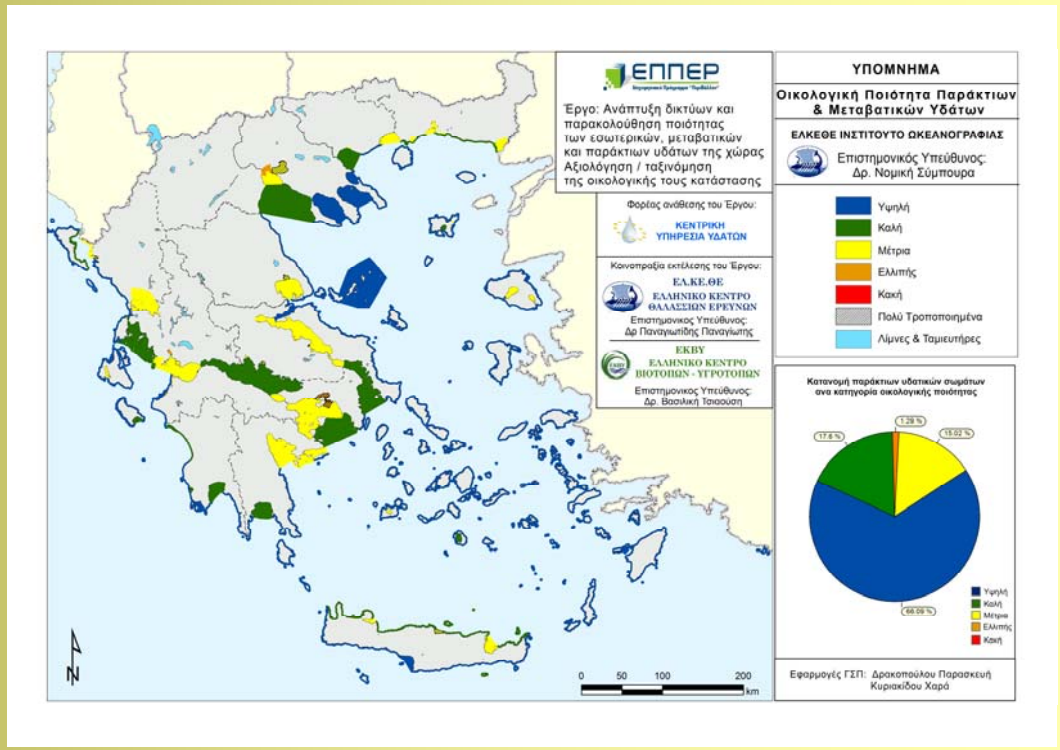
Shallow-water Benthic Food Web

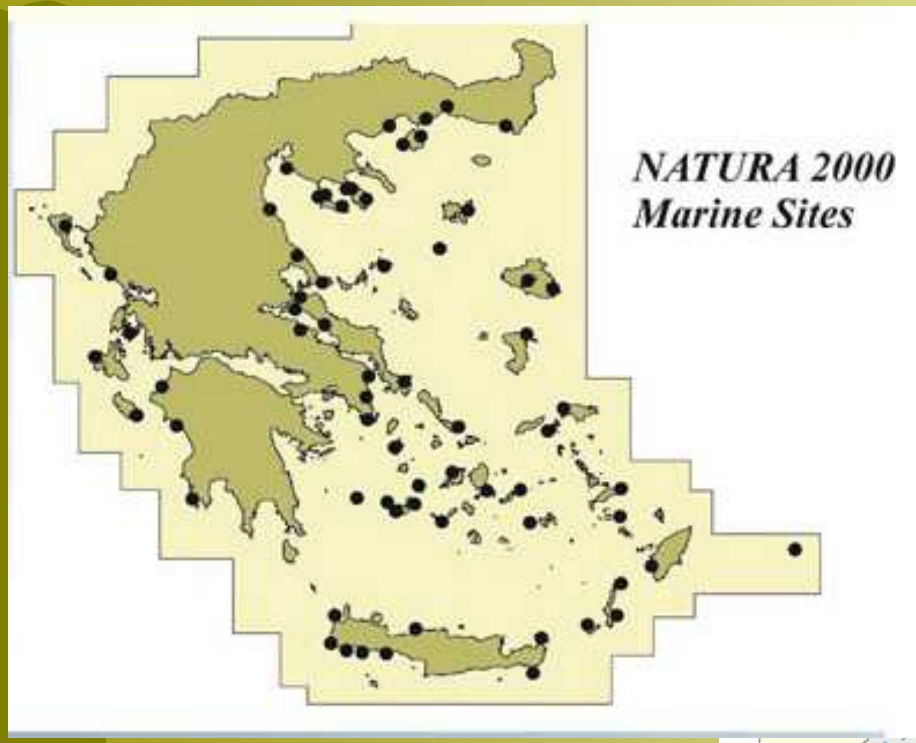


Implementation of the WFD in Greece

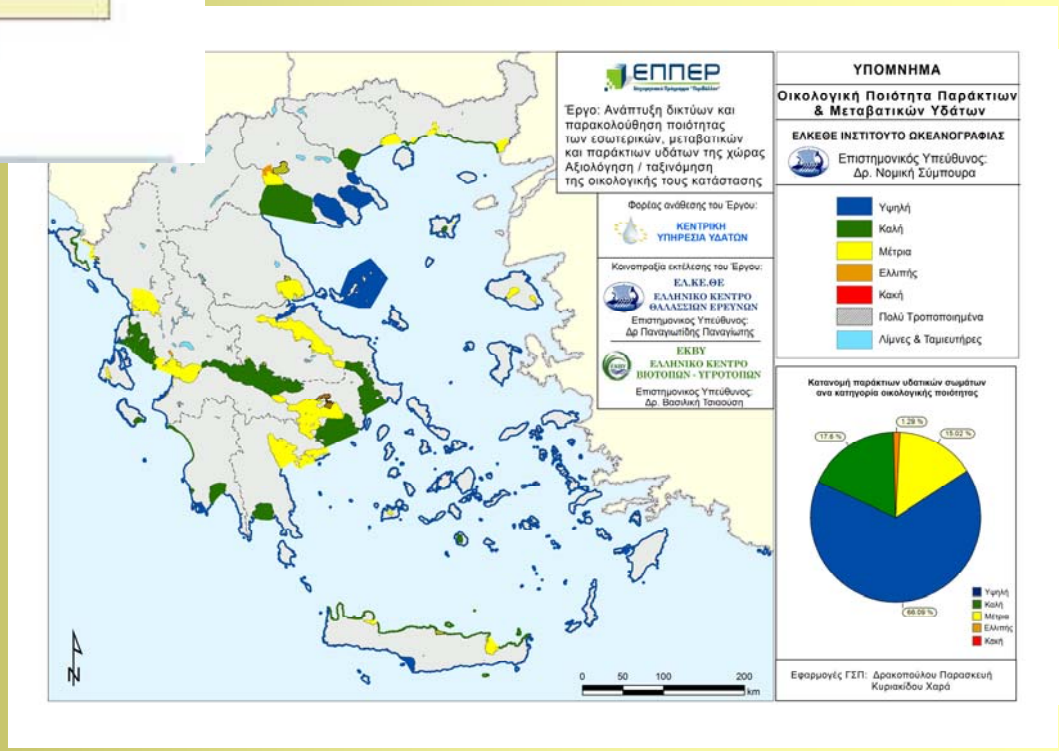
The institute of Oceanography coordinate the design of the national network for the WFD implementation

and gave the first estimation of Ecological Quality (2008 - 2009)





Habitat and WFD



Why a new Framework Directive?

- However, this is not enough.
- If we see the EU policy as a step foreword from the Member States policy and
- we agree that the sustainable management of the sea is something more than the coastal management we need more:
- The ***"Marine Strategy"*** Framework Directive voted on 2008.

Targets of the Marine Strategy F D

- The **Marine Strategy F D** clams for a “good environmental status” of all water bodies (under EU jurisdiction) at 2020.
- According to the text of the Marine Strategy F D *“Good Environmental Status”* is given by the synthesis of 11 descriptors
- In the text of the MSFD these descriptors are presented as “pre-conditions”

11 descriptors of the Marine Strategy F D

- Descriptor 1: “Biological diversity is maintained. The quality and occurrence of habitats and the distribution and abundance of species are in line with prevailing physiographic, geographic and climatic conditions”

D.1. Biodiversity
Habitat diversity:
1.1. Abundance, extent and distribution of different habitat types
1.2. Community structure
1.3. Habitat quality (Habitat composition and relative proportions (seabed)), intactness of habitats
Species diversity:
1.4. Species richness, evenness
1.5. Species range and distribution
1.6. Trends in abundance (numbers and/or biomass)
1.7. Population structure
Diversity within species:
1.8. Non-genetic indicators (size-structure or subspecies distribution
1.9. Genetic indicators, as genetic structure (e.g. differences among populations) or genetic diversity (e.g. numbers of alleles)

11 descriptors of the Marine Strategy F D

- Descriptor 2: “Non-indigenous species introduced by human activities are at levels that do not adversely alter the ecosystems”

D.2. Non-indigenous sp

Trends (*):

2.1. Abundance of NIS / IAS and proportion of NIS to native species (improved reporting system)

Bio pollution Index BPI:

2.2. Effects of NIS/IAS on communities, habitats and on ecosystem functioning

NIS=non-indigenous sp.

IAS=invasive alien sp.

11 descriptors of the Marine Strategy F D

- Descriptor 3: “Populations of all commercially exploited fish and shellfish are within safe biological limits, exhibiting a population age and size distribution that is indicative of a healthy stock”

D.3. Commercial fish
Sustainability of exploitation:
3.1. Fishing mortality related to a reference value
3.2. Trends in catches / biomass
Reproductive capacity:
3.3.Spawning Stock Biomass (SSB) related to a reference value
3.2. Trends in catches / biomass
Age and size distribution:
3.4. Log (abundance) related to a reference value
3.5. Trends in 95% percentile of the population length distribution

11 descriptors of the Marine Strategy F D

- Descriptor 4: “All elements of the marine food webs, to the extent that they are known, occur at normal abundance and diversity and levels capable of ensuring the long-term abundance of the species and the retention of their full reproductive capacity”

D.4. **Food** webs

Energy flow:

4.1. Ratio production of pelagic / demersal fish

4.2. Ratio macro benthic invertebrates / demersal fish production

4.3. Ration zooplankton production required / zooplankton production

4.4. Ratio benthic production required / benthic production

4.5. Predator performance (*) (e.g. seal population size and reproduction or seabird breeding population size and breeding success)

4.6. Tropic Levels (Functional feeding groups)

4.7. Marine Tropic Index

Structure:

4.8. Body size (length, weight) in selected functional groups/species

4.9. % large fish

4.10 Abundance and spatial distributions of - species of fast turnover rates - fish targeted by fishery - habitat-defining groups/specie - species/groups tightly linked to other tropic levels

11 descriptors of the Marine Strategy F D

- Descriptor 5: “Human-induced eutrophication is minimised, especially adverse effects thereof, such as losses in biodiversity, ecosystem degradation, harmful algae blooms and oxygen deficiency in bottom waters.”

D.5. Eutrophication
Pressure:
5.1. Nutrient (phosphorus and nitrogen) load
5.2 Nutrient concentrations
Direct effects:
5.3. Primary production
5.4. Chlorophyll a
5.5. Opportunistic macroalgae
5.6. Nuisance / toxic algal blooms
5.7. Algal community structure
5.8 Submerged aquatic vegetation - spatial coverage and density of beds
Indirect effects:
5.9. Dissolved oxygen
5.10. Benthos - diversity and proportion of sensitive vs. non-sensitive species (e.g. P-R model)
5.11. Benthos / fish kills
HAB=harmful algal blooms

11 descriptors of the Marine Strategy F D

- Descriptor 6: "Sea-floor integrity is at a level that ensures that the structure and functions of the ecosystems are safeguarded and benthic ecosystems, in particular, are not adversely affected”

D.6. Sea floor integrity

6.1. Structure of benthic habitats (% of area of invertebrates biomass and/or production above a given % of undisturbed areas

6.2. Abundance of bio-engineering species

6.3. Extent of habitats of bioengineers species

6.4. Extent of area with spatial or temporal hypoxia

6.5. Diversity and richness indices also taking into account species -area relationships

6.6. Proportion of number or biomass above a specified length

6.7. Biomass size spectrum

6.8. Shape of cumulative abundance curves of numbers of individuals by size group

6.9. Secondary production

6.10. Opportunistic-sensitive species proportion (eg. AMBI, P-R-medel)

6.11. Integration of indicators already used

11 descriptors of the Marine Strategy F D

- Descriptor 7: “Permanent alteration of hydrographical conditions does not adversely affect marine ecosystem”

D.7. Hydrographical conditions

7.1. Area of anoxic bottoms

7.2. Migrating fish/mammals

7.3. Changes in sedimentation

7.4. Changes in areas for fish/mammals reproduction

7.5. Changes in the benthic community

11 descriptors of the Marine Strategy F D

- Descriptor 8: “Concentrations of contaminants are at levels not giving rise to pollution effects”

D.8. Contaminants

Presence of contaminates:

8.1. Concentrations in water, sediments and biota

Effects of contaminants:

8.2. Levels of pollution effects, measured through available approaches/techniques, e.g. biological responses measurement, bio-assays etc

11 descriptors of the Marine Strategy F D

- Descriptor 9: "Contaminants in fish and other seafood for human consumption do not exceed levels established by Community legislation or other relevant standards."

D.9. Human consumption of fish

9.1. frequency of levels exceeding regulatory levels (*)

9.2. Actual levels detected

9.3 Numbers of contaminants for which exceeding levels have been detected

9.4. Origin of contaminants (geological versus anthropogenic; local versus long distance)

11 descriptors of the Marine Strategy F D

- Descriptor 10: "Properties and quantities of marine litter do not cause harm to the coastal and marine environment”

D.10. Litter

Amount, composition and source of litter:

10.1. **Litter** washed ashore and/or deposited on coastlines

10.2 . **Litter** in the water columns, including floating and suspended litter on the sea floor

10.3. **Litter** ingested by marine animals/birds

10.4. **Litter** of microparticles (mainly mircroplastics) derived from degradation of litter

10.5 Impact rates of depredated litter on organisms

10.6. Potential chemical pollution resulting from degradated litter (plastic)

11 descriptors of the Marine Strategy F D

- Descriptor11:" Introduction of energy, including underwater noise, is at levels that do not adversely affect the marine environment"

D.11. Energy (underwater noise)

11.1. The proportion of days p 1 in a calendar year in grid 15'N * 15'E/W rectangle that an anthropogenic impulsive sound of a frequency less than 10 kHz above 183 dB is made

11.2. The total number of vessels that are equipped with sonar systems generation sonar pulses below 200 kHz should decrease

11.3. Noise level within the 1/3 octave bands 63 and 125 Hz should not exceed the baseline values of year (2012) or 100 dB

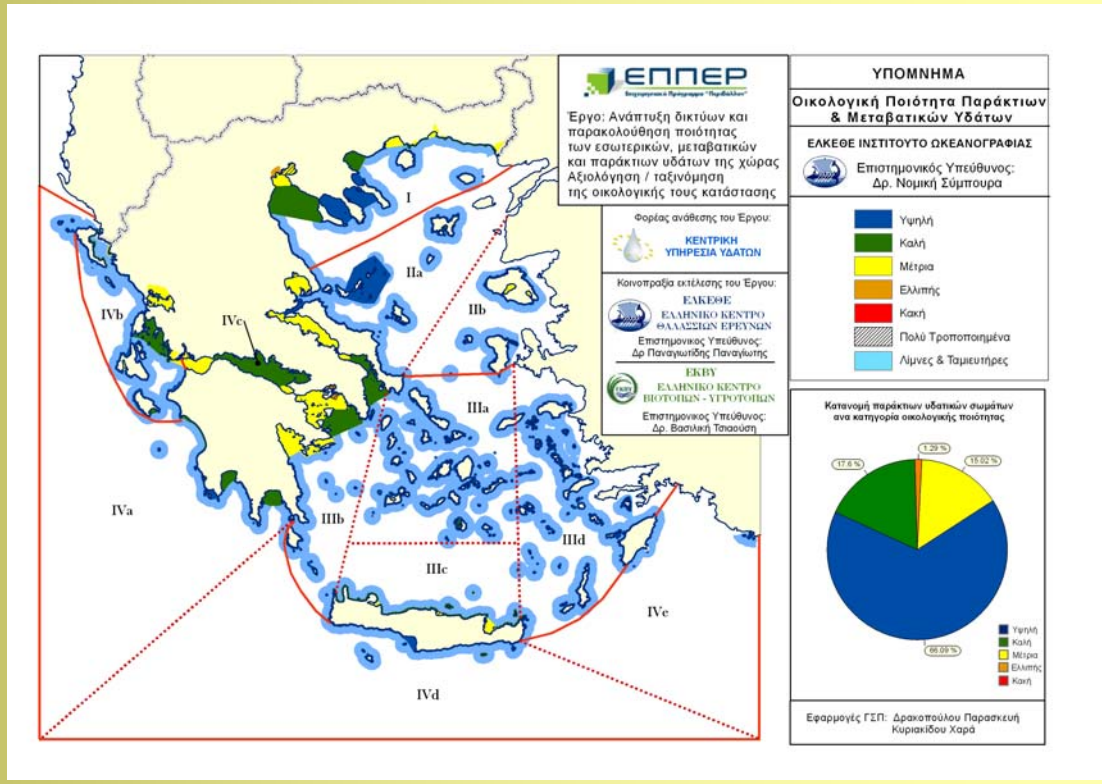
Challenges of the Marine Strategy F D

- Bearing in mind uncertainties about the combined impacts of measures to be introduced by the new Marine Strategy FD and about their potential costs for key economic sectors, a provision on compulsory impact assessments and cost-benefit analyses is needed at the regional level.
- The new Marine Strategy FD is very ambitious project and for the European Oceanographer the challenge is huge.

Towards the Marine Strategy Framework Directive Implementation

The Institute of Oceanography participates at the integration of the Directive at the national legal system

(2010)



Thank you for your attention