

# REMOTE SENSING AND COASTAL ZONE MANAGEMENT IN THE EU'S LESS-DEVELOPED AREAS: THE ROLE OF THE EUROPEAN FEDERATION OF MARINE SCIENCE AND TECHNOLOGY SOCIETIES (EFMS)

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## ABSTRACT

Coastal zones are vulnerable systems of great environmental and ecological importance. In addition, they play a significant role in the economic development of a region, as they are exploited through tourism, fishing, aquaculture and recreation. Many coastal areas, especially in the EU's less-developed areas are usually inadequately managed and subjected to various anthropogenic pressures through agricultural, urban and industrial activities.

In the past few years, there has been an increase in research related to ocean observing systems, resulting in considerable advances in Operational Oceanography. The establishment and use of oceanographic databases of various kinds is an important asset in the amalgamation of remote sensing and "on the spot" marine research, leading to the development of effective management schemes. However, the use and support of these scientific tools, techniques and processes is insufficient in many EU coastal regions.

In the effort to promote this course of action, the role of scientific organisations is absolutely essential. The EFMS (European Federation of Marine Science and Technology Societies) is already engaged in an attempt towards this objective, aiming to make the most of new scientists and effectively encourage all interested parties towards sustainable coastal zone management. The existing priorities of the EFMS lie with the Mediterranean and especially the Eastern Mediterranean, as it is one of the EU's less-developed areas yet environmentally significant.

## 1. GENERAL INTRODUCTION

Coastal zones are vulnerable systems of great environmental and ecological importance. In addition, they play a significant role in the economic development of a region, as they are exploited through tourism, fishing, aquaculture and recreation. The necessity for sustainable development of such areas is fully acknowledged by the European Union and described in environmental strategies. A lot of EU directives now incorporate the necessary legal commitments of member states in relation to the protection of the coastal zone.

Nevertheless, many coastal areas, especially in the EU's less-developed areas are usually inadequately managed and subjected to various anthropogenic pressures through agricultural, urban and industrial activities. These less-developed areas include coastal areas in which environmental monitoring schemes are not fully established; such areas exist on the whole European coastline and mainly in the Eastern Mediterranean,

Black Sea and parts of the Baltic Sea. Huge amounts of land-based pollutants are disposed in and around these coastal areas, both directly and indirectly affecting the marine environment and leading to ecosystem disruption and public health concerns. These problems are further enhanced in many cases by a communication gap between environmental scientists, decision-makers and local communities, causing a considerable impediment in any environmental management.

There are many gaps in knowledge regarding the water quality of the coastal zone; this includes the water column characteristics, the sediments but also levels of hazardous substances in some marine organisms. There are a number of important projects monitoring the quality of the marine ecosystems with emphasis mainly on areas with increased anthropogenic activities. However, there is a lack of background information for most of the coastal areas and islands. For the sustainable management of the coastal zone, it is very useful to have data on the environmental state of as many coastal areas as possible; this means that the monitoring studies should be extended to identify more hot-spot areas but also to study the non-polluted areas.

## 2. EXISTING PROGRAMMES AND NETWORKS

In the last few years, several in situ monitoring programmes are in operation with the aim of studying the quality of the marine environment, especially in hot spot areas. In many cases there are operational problems concerning spatial and temporal application due to financial difficulties and political priorities.

From the beginning of the 1960s, remote sensing techniques have been applied to the monitoring of coastal and offshore marine areas, through the use of thermal, optical, laser, radar and other sensors. These are able to measure physicochemical parameters, such as sea surface temperature, sea level, primary production, fisheries, suspended particulate matter and some pollutants (hydrocarbons), which directly affect the optical properties of the examined water body. Advantages include the prospect of large-scale and long-term overall observation of the main basins. The disadvantages are that not all parameters are measured and even these are limited mainly to the sea surface, while the observations are more effective when higher concentrations are involved, such as in the immediate time interval after an oil spill [1-6].

There has been an increase in research related to ocean observing systems, resulting in considerable advances in Operational Oceanography. There has also been an increase in all disciplines of coastal marine research. The establishment and use of oceanographic databases

of various kinds is an important asset in the amalgamation of remote sensing and “on the spot” marine research, leading to the development of effective management schemes.

Some examples of significant large-scale observation programmes and networks in the European Seas are:

- MedGOOS/EUROGOOS (<http://www.capemalta.net/medgoos/whatis.html>)
- BOOS (<http://www.boos.org/index.php?id=11>)
- MOON (<http://www.moon-oceanforecasting.eu/>)
- CORIOLIS (<http://www.coriolis.eu.org/>)
- ECOOP (<http://www.marine.ie/home/services/operational/oceanography/ECOOP.htm>)
- Mercator ([http://www.mercator.eu.org/html/mercator/index\\_en.html](http://www.mercator.eu.org/html/mercator/index_en.html))
- MERSEA (<http://baltic.mersea.eu.org/>)
- PROMISE (<http://www.nbi.ac.uk/promise/>)
- SEPRISE (<http://www.seprise.eu/>)
- SeaWiFS (<http://oceancolor.gsfc.nasa.gov/SeaWiFS/>)

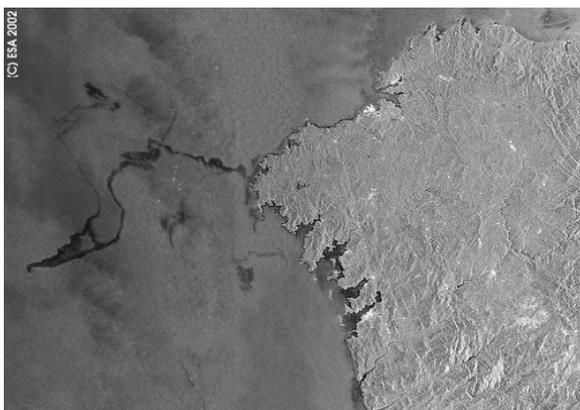


Figure 1. Prestige Tanker Disaster in Galicia (Spain)

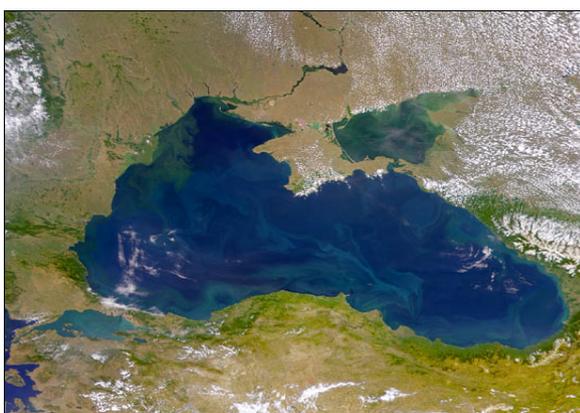


Figure 2. The Danube Spills into the Black Sea

Most of the existing projects, though of great importance, are related mainly to physical

oceanography and climate change, while there is only limited monitoring of chemical pollutants.

Some oceanographic data from European regions are shown in Fig. 1 [7] and Fig. 2 [8]. Fig. 1 shows the ASAR Wide Swath image acquired over the Galician coast in Spain a few days after the Prestige tanker spill, on 17 November 2002. Fig. 2 shows the Sea-viewing Wide Field-of-view Sensor (SeaWiFS) view of the Black Sea that reveals the colourful interplay of currents due to the nutrient-rich, sediment-laden discharge of the Danube River stimulating biological activity, on 9 June 2003.

However, the use and support of these programmes’ scientific tools, techniques and processes is insufficient in many EU coastal regions. Therefore, the encouragement of local authorities to be actively involved in relative projects in cooperation with the scientific community can effectively contribute to sustainable coastal management.

Furthermore, there is unfortunately no uniform environmentally friendly political approach. Frequently, we see that governments or governmental organizations are funding projects for the environment and at the same time development projects that are basically against it or against any concept of environmental protection. Science has to be introduced to policy but the contact of scientists with decision-makers is very complex. In the effort to promote this course of action, the role of scientific organisations is absolutely essential.

### 3. THE ROLE OF THE EFMS

The EFMS (European Federation of Marine Science and Technology Societies) is already engaged in an attempt towards this objective, aiming to make the most of new scientists and effectively encourage all interested parties towards sustainable coastal zone management. The EFMS consists of 14 non-governmental associations from 10 different countries that specialize in research and education pertaining to the marine environment. These are:

- Vlaams Instituut voor de Zee Belgium ([www.vliz.be](http://www.vliz.be))
- Marine Science and Technology Society of Finland ([www.smtts.org](http://www.smtts.org))
- Association of French Oceanographers ([www.uof-assoc.org](http://www.uof-assoc.org))
- German Society for Marine Research ([www.meeresforschung.de/DGM](http://www.meeresforschung.de/DGM))
- Marine Biological Association of the UK ([www.mba.ac.uk](http://www.mba.ac.uk))
- Society for Underwater Technology UK ([www.sut.org.uk](http://www.sut.org.uk))
- Scottish Association for Marine Science ([www.sams.ac.uk](http://www.sams.ac.uk))

- Challenger Society for Marine Science UK ([www.soc.soton.ac.uk/OTHERS/CSMS](http://www.soc.soton.ac.uk/OTHERS/CSMS))
- Hellenic Oceanographers Association Greece ([www.seok.gr](http://www.seok.gr))
- Israeli Association of Aquatic Sciences ([research.haifa.ac.il/~y.mart/israelaquatic/index\\_eng.htm](http://research.haifa.ac.il/~y.mart/israelaquatic/index_eng.htm))
- Italian Association of Oceanography and Limnology ([www.iii.to.cnr.it/aiol/](http://www.iii.to.cnr.it/aiol/))
- Italian Society of Marine Biology ([www.sibm.unige.it](http://www.sibm.unige.it))
- Association of Norwegian Oceanographers ([www.havforsk.no](http://www.havforsk.no))
- Swedish Society for Marine Sciences ([www.shf.se](http://www.shf.se))

The objectives of the EFMS are to contribute to the advancement of and disseminate information regarding research and education in marine science and technology in Europe. Members of the federation have carried out various European programmes and participated in numerous conferences, workshops and EU policy consultations related to the coastal zone. It is also currently involved in the identification of the “State of Marine Research in Europe” through a questionnaire on its website ([www.efmsts.eu](http://www.efmsts.eu)). The existing priorities of the EFMS lie with the Mediterranean and especially the Eastern Mediterranean, as it is one of the EU's less-developed areas yet environmentally significant.

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