



## **COSA: Coastal Sands as Biocatalytical Filters**

Translating scientific results to the general audience and policy makers

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### **Abstract**

Marine coastal zones are of significant socio-economical value and have to cope with intensive use and material input from land, rivers and atmosphere. A thorough understanding of the processes governing the functioning and cycling of matter in these environments is essential to ensure their sustainable use. The EU-funded project COSA was initiated to assess the role of sandy sediments in the coastal cycles of matter, and is based on an interdisciplinary approach combining the complementary expertise of seven participating institutions. This presentation addresses the multilevel organization of the COSA project, which was designed to ensure optimal implementation of the scientific results into environmental and social objectives. Emphasis is placed on the ways of making the research understandable for public and policy makers. Publication and translation of the scientific results into a language understandable to the general audience and policy makers is fundamental for implementation of the results into environmental strategies and concepts, and critical to ensure the sustainable use of coastal environments. As political pressure by a large fraction of the society is one of the most efficient ways to influence decision makers and investors, the need for working out a common "language" seems to be at least as weighty as the generation of scientific results and tools supporting the managers in making environmentally important decisions.

### **1 Introduction**

#### **1.1 Addressing coastal zone problems**

Public awareness of coastal zone problems is rather low, because the marine ecosystems are not as accessible to people as terrestrial ones, and research results or scientific papers are not suitable information material for the community and people with non-scientific background. The establishment of a "translating bridge" between two quite different worlds (scientific and non-scientific) allows to present coastal problems with the proper importance. This "translating bridge" could be established by environmental agencies, which are responsible for extracting the conclusions and consequences from the scientific processes, and then translating them into an accessible and understandable format for the general audience and policy makers. As the advisory bodies, they are able to affect the political decision and, through the educational and cultural activities, can promote public awareness. This is the most important step in the dissemination of the scientific results, which brings coastal problems actively to the attention of the local public and decision makers. Through this step, information is provided to policy makers and pathways and measures are suggested that can help to reduce or remove coastal zone problems. The EU project COSA integrates research institutions and environmental agencies within one project in order to ensure and optimize the implementation of the scientific results into environmental strategies and public awareness. This integration requires a "translating bridge" within the project. Here we outline how the generation of scientific results, their translation and implementation is organized within COSA.

## 1.2 Scientific challenge

Research in the North and the Baltic Seas and its coasts are excellent examples of the systematic effort of the marine science community to understand the processes and the human influence on these ecosystems. A focal point of this research are the coastal sediments that contribute significantly to the cycling of matter in the oceans and represent major storage reservoirs for organic matter, nutrients and also pollutants. Large sections of the European coasts are dominated by sandy sediments, and despite the small area sands cover relative to the total size of the ocean floor (approximately 5%) they are of great importance. Sandy coastal zones provide the most productive fishing grounds, are major sources for a variety of raw materials (oil, gas, water, and minerals), and form recreational beaches. At the same time, coastal zones are seriously affected by habitat destruction, water contamination and resource depletion.

Permeable coastal sands have been poorly studied up until now with respect to their role in the coastal cycles of matter. Due to the lack of quantitative data, they are not well represented in coastal management and monitoring programs, and public and policy makers are not aware of their importance. Consequently these environments and their resources are not protected sufficiently relative to their socio-economical value.

In November 2002, a new project funded by the European community was launched: COSA – Coastal sands as biocatalytical filters. Seven institutes from four European countries participate in this project, which focuses on the ecological role and management of nearshore marine sandy sediments. COSA research investigates processes in sand sediments at two field sites located on Polish and German coasts that represent typical sandy environments of the North and Baltic Seas (Fig.1). The project tasks include intensive field campaigns and time series measurements of key parameters. Special attention is given to the filtration and decomposition processes and ensuing fluxes of dissolved and particulate matter, and the impact of animals, plants and micro-organisms on biogeochemical reactions.

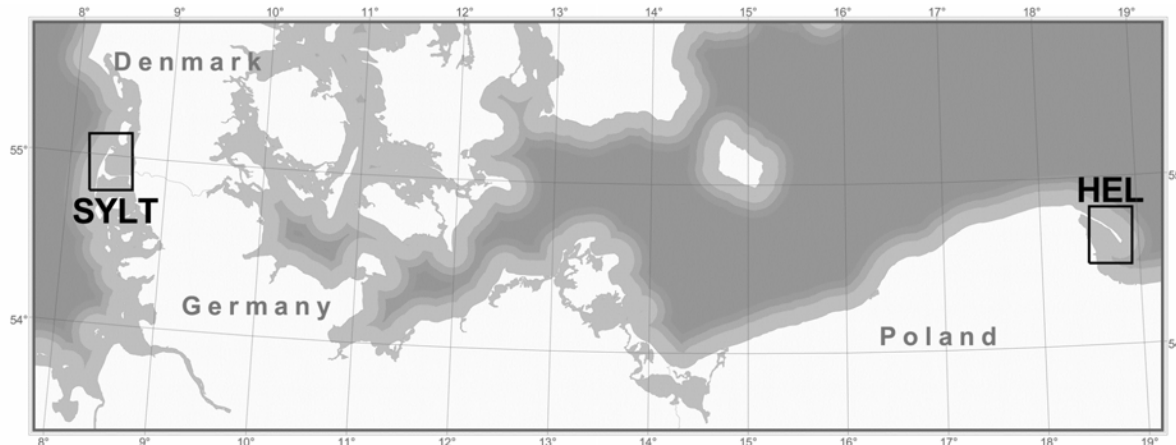


Figure 1: Map of Europe with study sites indicated.

## 2 Results

### 2.1 An integrative project approach

The concept of COSA combines scientific research and the implementation of the scientific results into management strategies within the project and, thus, integrates scientific and socioeconomical objectives.

In brief, the scientific goals are to generate a comprehensive database comprising the physical, biological and chemical parameters that govern the ecological functioning of coastal sands and to integrate these data in a model. The latter can be used as a predictive tool. The scientific goals can be achieved by investigations ranging from the analysis of historical data to physical, chemical and

biological measurements. This is accomplished by the interdisciplinary combination of complementary expertise provided by the participants of COSA.

The socioeconomic objectives of the COSA project are 1) to implement generated scientific knowledge and results into monitoring programs and environmental management concepts of the two nature preservation organisations participating in COSA, 2) to produce recommendations for the sustainable use of coastal environments, and 3) to increase the awareness of the public and policy makers regarding the importance and value of permeable sands.

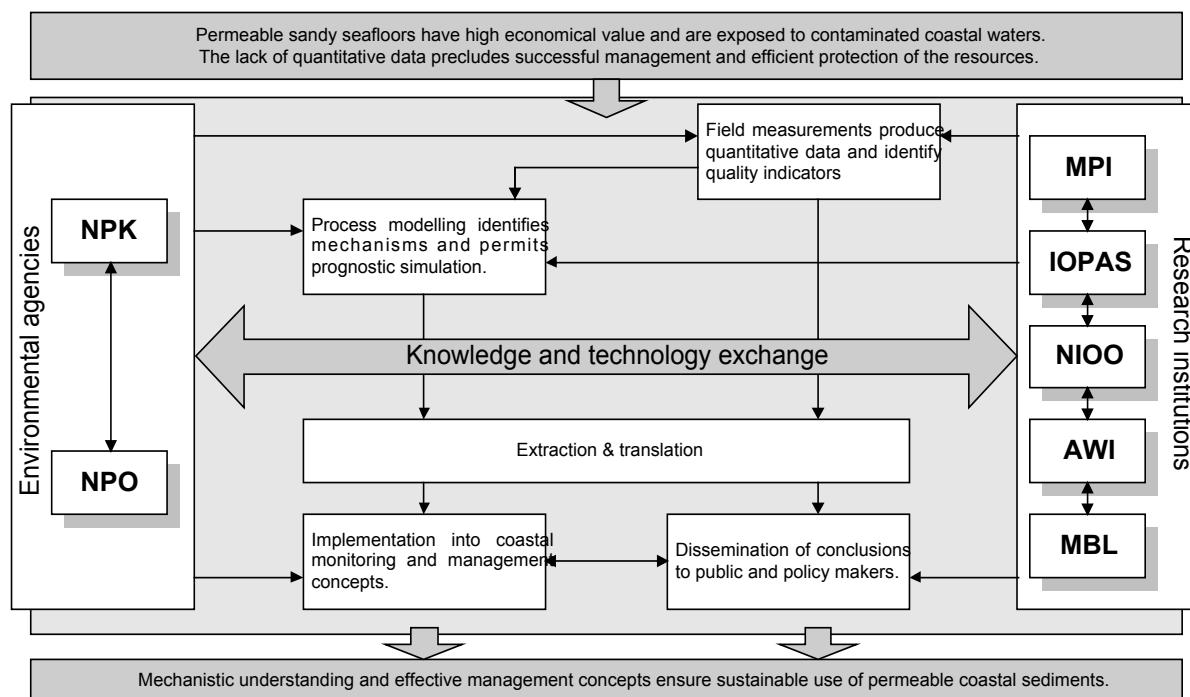


Figure 2: The concept of COSA. Research institutions as well as environmental agencies are integrated in the project to ensure optimal implementation of the scientific results into environmental objectives.

The participants of the European Project COSA are the research institutions:

- Max Planck Institute for Microbiology, Germany, (MPI)
- Institute of Oceanology, Polish Academy of Sciences, Poland, (IOPAS)
- Netherlands Institute of Ecology, Netherlands, (NIOO)
- Alfred-Wegener-Institute, Germany, (AWI)
- Marine Biology Laboratory, University of Copenhagen, Denmark, (MBL)

and the nature preservation institutions:

- Nadmorski Landscape Park, Poland, (NPK)
- National Park Office Schleswig-Holstein Wadden Sea, Germany, (NPO).

Within the work program of the project, the scientific tasks, the translation of the scientific results to the public and policy makers and the pathways for the implementation of the results into management concepts and decision making are described in detail. COSA now is operating successfully within its second year, and the integrative concept was proven to be an excellent approach to ensure the effective translation and implementation of scientific results. We show that the typical pathway from scientific research via scientific publications, news media to the general public and policy makers and

finally to the environmental agencies can be abbreviated, accelerated and optimized by including the environmental agencies within the project. Thereby the translation, dissemination and implementation of the scientific results can take place almost simultaneously with the generation of the results, saving time and minimizing the loss and distortion of valuable information.



Figure 3: Participants of COSA at the study site at Hel (Poland).

To give a specific example, Nadmorski Landscape Park, one of the environmental agencies participating in COSA, promotes awareness with respect to sandy coastal environments and the implementation of scientific COSA results via:

- educational programs:
  - teacher training workshops
  - lectures for school children
- seminars with local policy makers
- cooperation with the media (radio, TV)
- information exchange (research institutes, environmental agencies, nature preserve organisations)
- publications
- websites
- information materials, newsletters in the visitor centres.

Through the education of NPK personnel within COSA with respect to the processes in sandy coastal environments, and through exchange of information between the NPK and NPO (Nationalparkamt Schleswig-Holsteinisches Wattenmeer, the second environmental agency participating in COSA), monitoring and management concepts of the these two environmental agencies are adapted and optimized according to the scientific information generated within COSA.

### 3 Discussion

#### 3.1 Two-way flow of information

The integration of scientific institutions and environmental agencies within one project permits direct information flow and immediate feedback between these institutions, promoting focused research on the dominant problems identified by the environmental agencies. The integrated approach enhances the efficiency of applied research, while boosting fundamental research associated with these investigations. In COSA this is demonstrated through the development and deployment of novel instrumentation for the investigation of coastal sediments (Fig. 4).

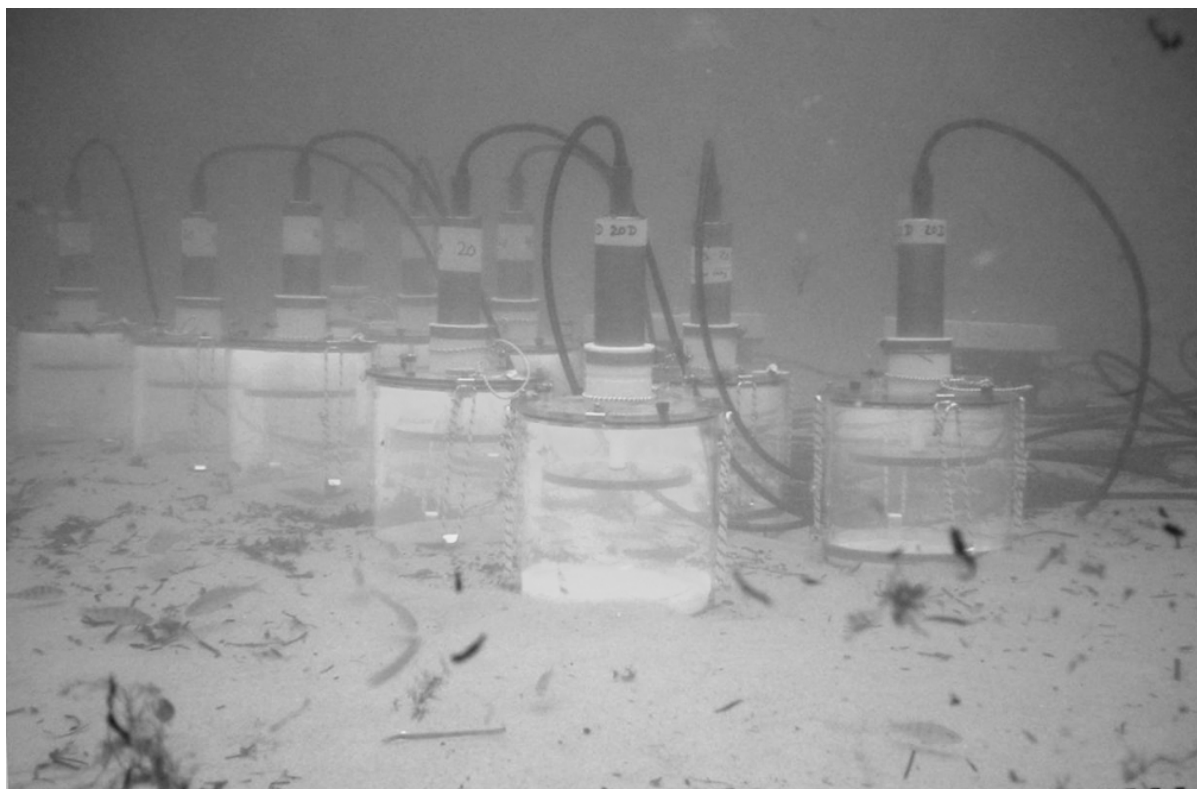


Figure 4: Advection chambers for the investigations of sediment-water exchange in permeable sediments constructed for COSA during a deployment at Hel.

The new instruments permit new insights in the functioning and the processes governing the cycling of matter in permeable marine sediments and, thus, generate fundamental data, which are needed to promote our understanding of this complex environment and to efficiently protect the coastal zone. Through increasing the knowledge and awareness concerning the sand ecosystem and introduction of improved assessment methods, COSA preserves European economical value by providing guidelines for the sustainable use of sandy coastal ecosystems. A better understanding of the sandy coastal seafloors will not only help to preserve a healthy coastal ecosystem but also ensure the quality of life, health and safety in the coastal zone and human population.

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