



Aquainnova

www.eatip.eu

ECOMANAGE

Integrated Ecological Coastal Zone Management System

The Challenge

Ecologists and social scientists are presently merging their skills for developing integrated tools to help decision makers in the difficult task of integrated coastal zone management. Three coastal zones showing conflicting interests between urban, industrial and agricultural pressures and environmental maintenance have been selected for developing the system. The selected areas are: Aisén Fjord in Chile, Bahía Blanca estuary in Argentina and Santos estuary in Brazil.

Relationships between the origins and consequences of environmental problems have been described using a Driving forces, Pressures, States, Impacts and Responses (DPSIR) framework and indexes have been used to assess links between DPSIR elements.

Participatory methods have been applied for interaction with stakeholders in order to establish study scenarios and indexes for social-economic and ecosystem analyses and to measure environmental impacts of management decisions. Field data and modeling results have been included into a Spatial Decision Support System (SDSS) for simplifying the assessment of the impact of management scenarios and evaluate their performance. The project aimed to raise the opportunity to improve normative rules for the functioning of the systems, and to improve in this way environmental management of the estuaries enabling sustainable development.

Project Objective

EcoManage project aims to push the capacity of assisting managers to join horizontally knowledge from ecological and socio-economic disciplines.

Key Points

- A coastal zone depends on local pressures, but also on pressures originated in the drainage basin, transported mostly by rivers and by groundwater.
- Socio-economic activities are the driving forces of those pressures and that their impacts on the ecosystem have feedback on socioeconomics.
- The impacts depend on physical characteristics of the ecosystem that together with the loads determine its ecological state.

EATiP Thematic Area of Relevance

TA1: Product Quality, Consumer Safety and Health

TA2: Technology and Systems

TA3: Managing the Biological Lifecycle

TA4: Sustainable Feed Production

TA5: Integration with the Environment

TA6: Knowledge Management

TA7: Aquatic Animal Health and Welfare

TA8: Socio-Economics and Management

Key Words

Integrated coastal zone management plans, socio-economic analysis, environmental management, spatial modelling, management scenarios

Project Information

Contract number:

3715

Contract type:

Specific Targeted Research Project

Action line:

INCO-A.2 Rational use of natural resources, INCO-2002-A2.2 Reconciling multiple demands on coastal zones

Duration:

42 months (01/12/2004 – 31/05/2008)

Coordinator:

Dr. Ramiro Neves, MARETEC- Marine & Environment Technology, Center, Instituto Superior Técnico Secção de Ambiente e Energia, Departamento de Mecânica, Avenida Rovisco Pais, 1049-001 Lisboa, PORTUGAL

Tel:

+39 0832 298684

E-mail:

coordination@ecomanae.info

Project website:

<http://www.ecomanae.info/>



Output Highlights

Identification of the main drivers and pressures

Based on the DPSIR framework, it was possible to identify the large-scale human drivers of change in each site, and to link them to impacts on the state of the system through the pressures. The first step in the DPSIR framework was the definition of the driving-forces that lead to environmental pressures. For this first step, the major stakeholders were identified and also their values, interests and possible conflicts between them.

Set up, calibration and validation of numerical models

A major outcome of the ECOMANAGE project has been the set up of numerical models for all the study sites. The MOHID modelling platform has been used to simulate the major processes of these distinct estuarine systems. Also, groundwater and watershed modelling applications were developed. The models have been calibrated and validated with historical field data sets and whenever needed, sampling campaigns were made to complement insufficient data. The use of models has made possible to clarify causes and effects in environmental processes, the distinction between anthropogenic and natural contamination sources and their respective impact at each site. In addition, modelling results have proved to be important to complement data from traditional experimental research methods and have become an essential tool during the project for understanding complex processes that link different compartments of the system and to run across the land-sea interface by linking catchments' and estuarine processes..

Testing development scenarios / management options with models

Model applications developed during ECOMANAGE project have been combined with the DPSIR framework with the objective of improving communication and understanding of the nature of the problems, thus helping in the decision making process. This was achieved by simulating different development scenarios for each site or by testing the outcome of different management policies in the ecological state of the system. These studies have addressed the housing and population growth effects on the Santos Estuarine system, sewage related problems in Bahía Blanca, and the effect of aquaculture waste products on the bottom water of Aysén Fjord.

Stakeholders' involvement

The project has promoted strong public involvement of stakeholders by giving them the opportunity to participate in decision-making processes, leading to the establishment of a straight cooperation between project partners and the main stakeholders in the studied areas. The totally new conceptual framework brought by ECOMANAGE improved the better understanding of the management issues in the three sites and lead to specific answers to local problems with generic methodologies. Outcomes of the project were of significant interest to both scientific and water resources management communities in all sites. ECOMANAGE project has helped in the public education and consensus-building processes and has promoted and encouraged public awareness and participation by making information widely available. A significant outcome of including local stakeholders has been a renewed cooperation pointing to future work and development of the work started during the project.

International, cross-disciplinary teamwork

A main achievement of ECOMANAGE is certainly the combined effort to achieve better management strategies for the study areas. Public and private institutions at each site have made part of the effort, working side by side with the scientific staff of the project. The project also provided the opportunity for a significant number of students to pursue their academic degrees, and for the collaboration of researcher from other institutions and universities. Many areas of expertise have been blended in the work of ECOMANAGE, including fields as ecology, water pollution, ecotoxicology, hydrodynamics, modeling, groundwater, economics and social sciences.

A decision support system

Another major product of the project was a site-specific knowledge base on estuarine and basin management, and a spatial decision support system to provide guidelines for restoration and sustainable development of the sites.

The Full Report:

For a description of the research project, visit www.ecomanage.info

Next Steps – Suggested Actions/Follow On



Policy

- Application of the newly developed spatial decision support system and identification of policy alternatives and assessment of their impact on the management objectives. This tool will help to evaluate and choose preferred policy alternatives between competing objectives and methods, allowing stakeholders to state their preferences (value-based information) for different outcomes, based on good information (factual or technical information).



Society

- Building up on the newly build public consensus and awareness to put in place sustainable practices and continue the cooperation with the different stakeholders to enable sound ICZM.

Related Publications/Projects

Yarrow MM, Tironi A, Ramírez AA, Marín VH, 2008, An applied assessment model to evaluate the socioeconomic impact of water quality regulations in Chile. *Water Resources Management* DOI 10.1007/s11269-008-9241-0

Yarrow MM, Marín VH, 2007, Toward conceptual cohesiveness: a historical analysis of the theory and utility of ecological boundaries and transition zones. *Ecosystems* 10:462-476

Marín VH, Delgado LE, Bachmann P, 2007, Conceptual PHES-system models of the Aysén watershed and fjord (Southern Chile): Testing a brainstorming strategy. *Journal of Environmental Management*. doi:10.1016/j.jenvman.2007.05.012

Bachmann PL, Delgado LE, Marín VH, 2007, Analysis of the citizen's participation concept used by local decision makers: the case of the Aysén watershed in southern Chile. *Int. J. Sustainable development* 10: 251-266
Marcovecchio, J.E. y L.D.Ferrer, 2005. Distribution and geochemical partitioning of heavy metals in sediments of the Bahía Blanca estuary, Argentina. *Journal of Coastal Research*, 21: 826-834.

Grecco, L.E., A.O.Marcos, E.A.Gómez, S.Botté y J.Marcovecchio, 2006. Natural and anthropogenic input of heavy metals in sediments from the Bahía Blanca Estuary (Argentina). *Journal of Coastal Research* SI 39: 1021-1025.

Popovich, C.A., C.V.Spetter, J.E.Marcovecchio y R.H.Freije, 2008. Dissolved nutrients availability during winter diatom bloom in a turbid and shallow estuary (Bahía Blanca, Argentina). *Journal of Coastal Research* 24: 95-102.

Popovich, C.A. y J.E.Marcovecchio, 2008. Spatial Variability of Phytoplankton and Environmental Factors in a Temperate Estuary of South América (Atlantic Coast, Argentina). *Continental Shelf Research* 28: 236-244.

Spanish

Delgado LE, Bachmann PL & Oñate B, 2007, Gobernanza ambiental: una estrategia orientada al desarrollo sustentable local a través de la participación ciudadana. *Revista Ambiente y Desarrollo* 23 (3):68-73

Delgado LE & Marín VH, 2005, FES-sistema: un concepto para la incorporación de las sociedades humanas en el análisis medioambiental en Chile. *Revista Ambiente y Desarrollo* 21(3):18-2