European Action Plan for strengthening the knowledge base of sustainable coastal and marine management

EXECUTIVE SUMMARY

The Action Plan addresses major shortcomings in knowledge and technology that presently hamper the implementation of sustainable coastal and marine management. It provides a reference base for future coastal and marine research investments in Europe and contributes to focusing these research efforts. The Action Plan was established at the Paris Conference of 5-7 December 2007, organised by the European Network for Coastal Research, ENCORA. The research directions set forth in the Aberdeen Declaration were an important starting point.

Hundred-eighty experts in different disciplines, invited for their outstanding expertise, submitted their personal ideas on critical knowledge gaps before the conference. These ideas were discussed in ten parallel workshops, each targeted at a specific aspect of coastal and marine management. Quite remarkably, many workshops had an outcome with a common denominator, leading to a few overarching recommendations (table 1).

The first prominent recommended action was:

I. Concerted development of a European network of Coastal and Marine Observatories

The observatories are development centres for the coherent collection and analysis of coastal and marine monitoring data, where innovative methods for observation and data processing are combined with advanced process-based modelling. In these observatories, data collection, analysis and model development are carried out in an interactive way, to increase our understanding of the complex interactions of physical, chemical and biotic processes in coastal marine systems.

This action is deemed crucial to advance our capability to forecast the response of coastal and marine systems to natural and anthropogenic change, including climate change and pressures resulting from development and exploitation.

Why:

In the past decade the performance of numerical models has substantially improved; they are more stable and run faster with higher spatial resolution. Application in real-world situations reveals that, although serious progress has been achieved in predictive power, calibration with field data remains necessary. The fact is that we are not yet capable to model the full complexity of interactions existing in nature, in particular the complexity related to interactions between physical, chemical and biotic processes. These interactions are not reproducible in the laboratory: we need field observations to study these interactions. However, the high natural variability in field situations, both in space and time, presents a major difficulty – we cannot control natural conditions to single out particular trends. We have to cope with this variability and therefore a major investment in better field observations is a prerequisite for making progress. Better means: more systematic, more consistent and more comprehensive. Present field programmes do not fulfil this requirement. The effort needed for such observational programmes is beyond the possibilities of single institutions or even beyond the possibilities of single countries. A coordinated effort at the European scale is required. This came out of most thematic workshops, and is addressed by the generic action for the concerted development of a European network of Coastal and Marine Observatories.

The second prominent recommended action was:

II. Concerted development of a European network of Capacity Building Resource Centres

The Capacity Building Resource Centres cooperate in the development of education and training curricula for coastal and marine resource management. They also develop methodologies and tools for marine and coastal spatial planning, for involving public stakeholders and for performing integrated assessments, including the definition of appropriate measurable indicators.

The strength of the concept of Capacity Building Resource Centres stems from the interaction between practice and policy training and the development of management tools.

Why:
The interaction between science and policy is generally weak, available knowledge is not effectively used and institutional capacities are not well developed. This is illustrated by inconsistencies between land and sea planning, by inconsistencies among existing environmental regulations and by the lack of instruments for their implementation, including the communication with stakeholders and the public. Existing mechanisms to inform policy makers, planners and managers of the coastal and marine environment are not adequate. Essential information on social and economic drivers and their spatial impacts is often not available. There is an urgent need for strengthening the interface between science and policy and for the development of tools that can be used in practice by policy makers and planners. This is addressed by the second generic action for the concerted development of a European network of Capacity Building Resource Centres.

The conference participants also identified issues where progress crucially depends on filling lacks in present scientific knowledge. Recommended actions are summarised in table 2

One action relates to

III. Coastal defence risks and the development of adaptive management strategies,

for responding to the impacts of climate change. Crucial knowledge gaps regard the long-term morphologic modelling and the development of work-with-nature approaches for coastal defence and habitat management.

A second action relates to

IV. The impact of increasing maritime traffic and the impact of change in river regimes and pollutant loads

The development of effective prevention and mitigation measures and the harmonisation of existing regulations is hampered by crucial knowledge gaps regarding the fate of pollutants and their long term impact.

IMPLEMENTATION

The highest ranking recommendations I and II go further than the usual project-based cooperation. They call for a fundamental change in the way knowledge is produced and applied in the coastal and marine fields. They imply a revision of the relationships between science, policy and practice in the member states and European Institutions. A much closer interaction is required, if we want to strengthen our capacity to deal with the challenges set by climate change, development pressure, trends in environmental quality and extreme events. Science-policy cooperation is essential for informing the public and for creating a sense of urgency. The recommended actions for creating networks of Coastal and Marine Observatories and Capacity Building Resource Centres will only be effective if full advantage is taken of the European scale. The European Union can provide important incentives through the European Maritime Policy.

The Action Plan outlines the long-term perspective for structuring the capacity for knowledge production and application in the coastal and marine fields. The realisation requires a carefully designed process. This process should start with generating a broadly shared recognition of the pertinence of the recommendations formulated in the Action Plan, not only in the science community but also in the communities of policy and practice. This process of creating awareness can go alongside a few pilot initiatives in a regional sea context. In these pilots the concepts of Observatories and Capacity Building Resource Centres are explored, as new ways of integrating science, policy and practice. We call in particular on existing European cooperation structures – the European Maritime Policy, the EU RTD programme, the European Research Council and MarinERA – to support and prepare these steps.

Table 1

TITLE	I. CONCERTED DEVELOPMENT OF A EUROPEAN NETWORK OF COASTAL AND MARINE OBSERVATORIES
WHY	There is a urgent need for: - Trans-national coherence of information for coastal and marine research and management; - A distributed repository system for coherent and integrated data; - A European platform for concerted development of tools for analysis, planning and communication; - Linking data and modelling at different spatial and temporal scales; - Linking information of different ecosystem compartments (water, groundwater, sediment, biota) and socio-economic compartments (user functions, governance, jurisdiction);
WHAT / HOW	In the frame of a European Network of Coastal Observatories, concerted actions are undertaken for the development and common implementation of: - Schemes and protocols for sustained observation, to increase our understanding of coastal and marine processes and to produce adequate information for sustainable resource management, spatial planning and public participation, at appropriate temporal and spatial scales; - Assessment protocols and indicators for ecosystem health, for biodiversity change and sustainable resource management; - Improved data-model interfacing to provide real-time information and long-term forecasting; - Vulnerability/sensitivity maps and tools for trend analysis and early warning; - Visualisation techniques for management and stakeholder consultation; - Technological innovation for observation of ecosystem characteristics (habitats, biodiversity), water and sediment quality (pollution levels) and physical parameters (underwater light, turbulence, fluxes).

TITLE	II. CAPACITY BUILDING, PLANNING AND PARTICIPATION
WHY	The implementation of ICZM is hindered by: - Lack of institutional capacities; - Lack of information on social and economic drivers and impacts; - Ineffective communication between science, the administration, stakeholders and the general public; - Lack of adequate spatial information; - Inadequate linkage of land and sea planning.
WHAT / HOW	- Establishment of Capacity Building Resource Centres for education, knowledge transfer to coastal practitioners and training; - Development of a methodology for marine spatial planning, as a framework for marine governance; - Development of an ICZM and Marine Planning Tool Box, including indicators and related monitoring methods, and tools for integrated assessment, for awareness raising, participatory approaches, conflict resolution and for visualisation.

Table 2

TITLE	III. MANAGING COASTAL SYSTEMS FOR SAFETY, CLIMATE CHANGE AND SUSTAINABLE DEVELOPMENT
WHY	- Obsolete and malfunctioning coastal structures are widespread along the European coastlines and need to be renewed; - New concepts must be developed for coastal protection measures matching the NATURA 2000 objectives; -Marine ecosystems, coastal habitats and biodiversity play an important role in the adaptation to climate change and in mitigating the impacts; - Adaptation to climate change requires adequate management of scarce sediment sources; - Practical guidance is needed for implementing the ecosystem approach and the "working with nature" principle.
WHAT / HOW	- Understanding and modelling of the delicate balance between coastal morphology and external forcing, and the response to climate change and local interventions; - Understanding and modelling the dynamic interaction of morphology and biota, including variability; - Development of methodologies for forecasting the response of coastal habitats and biodiversity to natural and anthropogenic changes, including climate change; - Model developments to make predictions over different planning horizons and to assess predictability limits, self-organisation phenomena and uncertainty; - Development of a hand book of good practices, in particular for adaptive management strategies in the context of climate change.

TITLE	IV. POLLUTION
WHY	Development of ship traffic and bigger ships increase the risk of accidental spills and produces indirect impacts related to dredging and port development; Fluvial pollutant loads will change, due to development in upstream catchment areas, to climate change and to river regime changes.
WHAT / HOW	Field and modelling research leading to: - Better understanding of interactions between pollutants, sediments, pore water, seawater and groundwater, and coupled transport-biogeochemical modelling; - Assessment tools (including remote sensing and models) for the long-term impact of pollution on ecosystems; - Development of a sensitivity index and sensitivity/vulnerability maps; - Integrated assessment of ecological and socio-economic impacts for optimising and harmonising existing regulations.