IMPROVING SUPPORT OF COASTAL INFORMATION SYSTEMS TO ICZM

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In 2011, the European Commission launched a review of the EU ICZM Recommendation (2002/413/EC) with a view to a follow-up proposal; an impact assessment was therefore conducted to explore the need and options for future EU action and to assess related potential social, economic and environmental consequences (http://ec.europa.eu/environment/iczm/ia.htm). This activities implied a wide variety of initiatives aiming to provide input to the Recommendation review, e.g.: an on-line public consultation; a public hearing event; Member State reports on progress in ICZM implementation; the OURCOAST project gathering and disseminating case studies and practical examples of coastal management practice in Europe; studies to inform the impact assessment, including the study "Options for coastal information systems".
One of the main challenges in the implementation of ICZM is the integration of different sources of knowledge and different types of information in order to better understand coastal processes and dynamics and to develop scenarios for better evaluate, and manage properly, the possible impacts deriving from different coastal uses (Meiner, 2010). Within this framework, gathering and proper structuring of relevant data, transparent and ready available information to decision makers and stakeholders, adequate communication to citizens, information sharing, effective and concrete use of data and information in policy and decision making are all key elements to support and implement integrated planning and management of coastal zones (Rodriguez et al., 2009; O'Dea et al., 2011; Wright et al., 2011). The diffusion, further development (including innovation) and actual use of coastal information systems (CISs) can therefore concretely improve the implementation of ICZM in Europe; indeed this is one of the strategic objective of EU ICZM related policies.
The study "Options for coastal information systems", funded by the European Commission[1], aimed to contribute to this overall goal, in particular by the identification of the key structuring requirements and related policy options for CISs that may significantly improve their support to ICZM implementation through scientifically-based data, functions, tools and mechanisms.
As a first step, the study analysed forty CIS illustrative cases, representing different levels of application (local, sub-national, national, transnational and regional sea one), regional seas and CIS' typologies. Based on the gained results, twelve cases were further in-depth analysed through direct interviews of main involved actors (users and/or developers), including among the others the Venice CIS case study. This case, similarly to the others, was selected since respond to the following criteria: (i) covers a wide range of ICZM information dimensions and sectors; (ii) provides good illustrative examples of integration among data and information related to different ICZM sectors and dimensions; (iii) provides good illustrative examples of ICZM knowledge and/or process related functionalities; (iv) is integrated with other tools, (v) is directly linked to an on-going ICZM process. The analysed Venice CIS is actually a system of different (on-line and off-line) tools (GIS, databases, models and DSS), used to manage and analyse an incredibly rich and wide amount of information about the Venice Lagoon. The CIS support the activity of the Venice Water Authority, i.e. the body responsible for the safeguarding of Venice and its lagoon. Within this unique scope, different tools are used to support different activities, including: studies, planning, project design, realisation of interventions and monitoring. Currently, data and tools are being used to develop a new Web-based CIS to support the operation of mobile gates protecting Venice from high water events and more in general to promote sustainable management of Venice lagoon.
Main conclusions of the CISs' overview and in-depth analysis can be summarised in the following points:

- For the great majority of analysed CISs the area of interest is mainly defined by administrative boundaries rather by the adoption of an ecosystem-based approach;
- Territory and environmental data are properly considered in CISs, while social and in particular economic and governance data are rather limited;
- Other data gaps or weaknesses are related to: (i) historical series, generally limited to a small number of specific issues, (ii) climate change related data, (iii) 3D data;
- Almost half of the analysed CISs provides basic ICZM knowledge and process related functionalities, as for example: availability of geo-spatial data, operation at different spatial scale, support to problem understanding and structuring;
- More advanced ICZM functions are much less available, such as: ICZM indicators and indexes, climate change related functions, stakeholder involvement and participation, vision building and scenario development, support to adaptive planning and management;
- Tools enabling an appropriate e-participation in ICZM (i.e. e-forum, geo-tagging, platform for participated GIS, wiki-like tools, etc.) are still not much diffused (20% of the cases).

The CISs' analysis showed that the problem to be addressed – improving CISs' support to ICZM – is a twofold problem: (i) underuse or improper use of existing CISs within the ICZM process at various scales, (ii) existence of weakness and gaps to be addressed through the development of new CIS' features to further improve their use within the ICZM process at various scales.

Based on the above results, the second step of the study identified main policy requirements of CISs to improve their support to ICZM. Policy requirements refer to all CIS' components including in particular: contents (data, information and related structuring), on-line functions and tools related to different target users (expert and non-expert), CIS' scope in relation to different users (decision and policy making, coast management and planning, stakeholder participation, etc.), and management and operation mechanisms. Contents and function requirements can mainly act on the design and development of new CISs features thus principally addressing the second aspect of the identified problem, while scope and mechanisms requirements can also determine significant improvement in the use of already existing functions, thus strengthening their positive effects on the ICZM process (first aspect of the problem).

Identified requirements were then aggregated to formulate policy options, whose specific objectives are:

- Increase the use of CISs in providing full support to implement the key ICZM principles, in particular as defined by the Recommendation 2002/413/EC;
- Provide support (through data, functions and management mechanisms) to the on-going integration process between ICZM and MSP, and more in general between ICZM and close related policies (including in particular the EU policy on climate change adaptation);
- Simplify the use of coastal information systems in order to make easier and more immediate their support to the ICZM decision making.

In relation to the identified problems and objectives, the study identified three policy options. i.e. integrated and homogenous sets of the key policy requirements. Firstly a "baseline scenario" was defined, to set a reference benchmark for the impact assessment of the policy options. In the specific context of the study, the baseline scenario was defined as the scenario not including the implementation of new policy requirements for CISs and implying the fulfilment of already set legislative requirements, in particular related to implementation of the INSPIRE Directive. The formulated policy options can be summarised as follow:

- P1 – Improving data and information base;
  P1 policy option deals with the principal identified data and information gaps. The final goal is the support to the creation of wider CISs able to address the various sectors and integrated aspects of the ICZM holistic approach as well as its long-term perspective, thus improving the current main contents gaps characterising the baseline scenario (in particular in relation to social, economic and governance data). The implementation of the P1 policy option mainly relies on the integration within

CISs of already existing data and information, still not included in the system, rather than on the acquisition of new data or the realisation of new studies.

- P2 – Improving and innovating functions and tools;
  P2 policy option mainly aims to improve the availability of functionalities and tools directly supporting ICZM decision makers and coastal planners and managers, as well as to increase stakeholders' involvement and participation in the ICZM process. The implementation of this option will significantly evolve the current state of the art (baseline scenario) in relation to interactive tools (for ICZM decision making and stakeholder involvement) available on-line.
- P3 – Enhancing cooperation;
  P3 policy option mainly aims to enhance cooperation among different subjects involved in the CISs implementation and management and more in general in the ICZM process, thus improving the CISs support to this latter. The P3 policy option is implemented through the following principal specific issues: (i) progressive shift towards the adoption of an ecosystem-based approach in the definition of the CIS's context and geographic area of application; (ii) strict link and cooperation between the structure responsible for the CIS management and operation and the structure responsible for the implementation of the ICZM process, (iii) improvement of the use of protocols facilitating geo-spatial data sharing, implying cooperation among different data producers and managers. P3 focus is mainly on the reinforcement of coordination mechanisms that can enhance the CIS usefulness in promoting and implementing ICZM principles.

Policy options were then assessed (third step) in terms of direct (or primary) and indirect (or derived) impacts (EC, 2009). Direct impacts are those related to effects directly determined by a CIS policy option on key issues of ICZM implementation in Europe or to the use and the operation of the coastal information systems. Indirect (economic, social and environmental) impacts are those directly or indirectly deriving from direct ones. All the three options represent a significant step forward compared to the baseline scenario, since they include new requirements to be implemented in the CISs, contributing to further increase the support to the ICZM process. The impact assessment showed that the three policy options can be conceptually distributed along a gradient. P3 represents the most ambitious policy option, in terms of economic and human resources likely required for its implementation, but also in terms of expected direct and indirect benefits. P2 is in a relative medium position, while P1 is characterised by a relative lower level of ambition.
The full implementation of the P3 option would require an effort (to upgrade about the 64% of existing CISs) that is 1.6 greater than the one required by the full implementation of the P1 option (corresponding to 41% of CISs to be upgraded); P3 expected effort is also greater than P2 one (56% of CISs to be upgraded). The following rough schematisation of policy ambition and implementation challenge can be therefore defined: P3 > P2 > P1. However, the implementation of all the three policy options still requires relevant efforts.
Significant differences exist among the various European regions in relation to the current implementation level of the three policy options and the related expected benefits and effort needed for their further improvement. The analysis showed the greatest challenges in general are related to: (i) the P3 option implementation in all the regions with relatively minor relevance for the North Sea and (ii) the Black Sea region for all the three policy options, where however there are significant on-going initiatives that will probably improve the current situation.
In terms of policy instruments for the implementation of the different option the following main considerations were provided by the study:

- P1 policy option includes essential requirements to improve the CISs' capacity in supporting the ICZM process and can be therefore considered as a necessary (or basic) step to improve CIS' support to ICZM. In this perspective, this policy option could be incorporated in an EU binding legislative framework (i.e. EU Directive) defining obligations for the ICZM implementation, also in relation to the CISs further improvement. A strict link with the INSPIRE Directive is also essential for the P1 policy option implementation.
- An EU binding legislative framework could also fit with the second policy option (P2), which also includes some essential requirements for the improvement of the CISs support to the ICZM process (i.e. the development of new tools to better support

ICZM decision making and stakeholders' participation). However, P2 could be more efficiently implemented through the Recommendation policy instrument that enables a higher level of flexibility.

- The implementations of the P3 policy option (focusing on enhanced cooperation) can be likely more efficiently supported through incentives, e.g. a policy programme providing a common framework for and financial support to projects and studies dealing with P3 key issues. The higher costs related to the P3 policy option also suggest to avoid the adoption of a strictly binding approach for the implementation of this policy and to prefer a more flexible and progressive mechanism.

As a final conclusion, the study suggested to adopt a two phase approach. The first four-five years phase would focus on P1 and P2 policy options (to be implemented through an EU Directive and/or an EU Recommendation). The first phase should not totally neglect the P3 option; whenever opportunities arise this should be promoted through a dedicated policy programme, even if the major focus would be on P1 and P2, and its implementation monitored to correctly depict the occurring progresses. An interim and final evaluation of the first phase results will be useful to prepare the second phase that would specifically focus on the implementation of the P3 option. This evaluation will be also useful to fine-tune the policy instrument to be used to successfully implement the P3 option in the second phase, i.e. the continuation of an incentives-based policy programme and/or the development of another policy instrument (e.g. a specific EU Recommendation).

[1]Disclaimer: "This abstract does not necessarily represent the opinion of the European Commission"

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