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An indicator set to measure the progress in the implementation of integrated coastal zone management in Europe

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Abstract

A new model indicator set to measure the progress in the implementation of integrated coastal zone management (ICZM) is described. The methodology that has been used recognises that the ICZM management cycle can be broken down into a series of discrete ranked actions. These actions show what is needed, using a straightforward, step-wise methodology, to pass from a situation where no ICZM is being used to one where it is being fully implemented, by being grouped into a series of five discrete ordered and continuous phases. The actions, 26 in total, are not completely exhaustive but are comprehensive enough to allow progress in ICZM to be measured. A comparative analysis can then be conducted by an assessment using semi-quantitative criteria.

Set alongside indicators of sustainable development or state of the coast, this indicator set will also be a test of the hypothesis underpinning the EU ICZM Recommendation—that ICZM is a prerequisite for a more sustainable coast.

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1. The political development of ICZM in Europe

Integrated coastal zone management (ICZM) is generally recognised as the most effective tool for incorporating conservation and sustainable use of marine and coastal biodiversity aspects into the planning of coastal areas. Therefore, the growing concerns about the deteriorating state of the European coast, environmentally, socio-economically and culturally, have prompted the European Commission and Member States, since 1996, to introduce a range of measures. It is these intentions that will lead to a sustainable development of the whole European coast in the future. The first of these was the Commission's Demonstration Programme. This 3 year programme [1] included 35 individual projects and six thematic studies, embracing the Baltic Sea, North Sea and Atlantic seaboard and the Mediterranean Sea, and was launched in 1996. It was a joint programme of the three Directorates General viz. Environment, Regional Development and Fisheries. Its aim was to test co-operation models for integrated management of the coastal zones and to stimulate a broad debate amongst the various stakeholders involved in coastal planning, management or use of the coastal zones. It was also to provide the technical results necessary to foster dialogue between the European Institutions and coastal stakeholders. Based upon the results of this programme, the European Commission has subsequently produced two important documents on the subject of Integrated Coastal Zone Management. The first of these is a strategy for Europe [2] concerning the implementation of ICZM throughout the EU coastal states. This 38-point strategy consists of a series of concrete actions building upon existing instruments, programmes and resources and is a flexible, evolving instrument, designed to cope with the specific needs of the different regions and conditions. One of the activities (no. 27) calls for the improvement of data provisions and use of this data to produce indicator-based assessment reports.

The second document is a Recommendation [3] which was called for as the first point of the strategy. This Recommendation, although not legally binding, has now been adopted by all member states for implementation. This means that all EU (and acceding) countries are committed to ensuring that the content will be executed. It reiterates the need for a strategic approach to the management of the coastal zone which is underpinned by a number of important principles such as the eco-system approach, the precautionary principle and adaptive management. Member states are further obliged to undertake a national stocktaking which must analyse which major actors, laws and institutions influence the management of their national coastal zone. They must also, based upon the results of the stocktaking, develop a national strategy for the implementation of ICZM. Such a strategy must include i.a. adequate systems for collecting and providing information in appropriate and compatible formats to decision makers at national, regional and local levels to facilitate integrated management.

A high-level forum [4] on community strategies for ICZM was subsequently held in La Vila Joiosa (Spain). It called upon the Member States to promote the general use of existing comparable indicators for sustainable development and to develop indicators, on a national basis, to provide standardised descriptions of the status of

the coast and possible impacts of human indicators as well as of *the progress made towards ICZM in Europe.* It further recommended that a group of experts be created with the objective to support the implementation of the EC recommendation. Such a group was drawn up and held its first meeting in October, 2002 in Brussels. One of the decisions of the group of experts was to create a working group to deal with indicators and data (called WG-ID) under the leadership of the European Topic Centre Terrestrial Environment. The mandate of WG-ID was to advise the expert group on ways in which an indicators-based assessment could be taken forward and to prepare a report on coastal and ICZM indicators and data for the next meeting of the group of experts to be held in June, 2003.

At its first meeting, held in Barcelona on the 7th February, 2003 the WG-ID began an exchange of views concerning the types of indicators that are useful for monitoring progress in ICZM implementation. It recommended the use of comparable indicators to assess both the status of the coast and the degree to which an integrated system of coastal management is being implemented around the European littoral. A subsequent meeting set the objective to build a common set of indicators to ensure comparability of reporting at European, regional (regional seas), national and sub-national levels. The authors were delegated the challenging task of trying to produce an indicator set which could be used pragmatically to measure the degree of implementation of ICZM in the EU member states.

2. Development of an indicator set to measure the progress of integrated coastal zone management

ICZM has been defined by the EU as a dynamic, multi-disciplinary and iterative process to promote sustainable management of coastal zones covering the full cycle of information collection, planning, decision-making, management and monitoring of implementation. This cycle was originally developed by GESAMP [5] and modified by Olsen [6] who suggested that a typical ICZM cycle would require 8–15 years from an issue identification to evaluation (see Fig. 1).

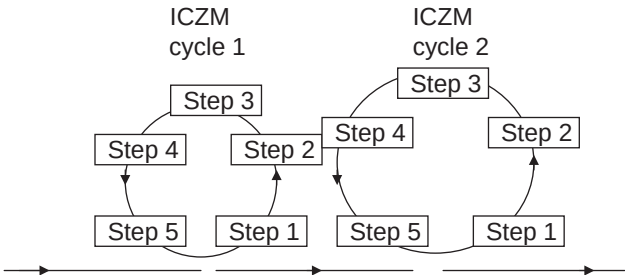

Fig. 1. The cyclical nature of ICZM, adapted from GESAMP [5]. This dynamic method of coastal management requires feedback between various steps of the sequence. The five steps in the process correspond to the five phases in Table 1. Progressively, larger cycle loops indicate increased complexity of issues being addressed. It has been suggested [13] that each cycle would require 8–15 years.

However, in order to be able to determine how well or efficiently ICZM is being implemented, an indicator to measure the degree of implementation of ICZM needs to be delineated. Such an indicator should be so designed as to be able to measure the cyclical progression of ICZM itself rather than the results of any ICZM initiatives undertaken.

An indicator provides a simplified view of a more complex phenomenon or provides insights about a trend or event that cannot be directly observed. Indicators are commonly used as management tools to define the nature and size of problems, set goals for their solution and track progress towards these goals. They often form the basis for national and international decision-making. The criteria for a policy-relevant indicator [7] are:

- Does it provide a representative picture of the parameter under study?
- Is it simple, easy to interpret and able to show trends over time?
- Is it responsive to changes in the coastal environment and related human activities?
- Is it national in scope or applicable to local and regional coastal issues of national significance?
- Does it have a threshold or target value against which to compare it?
- Is it well-founded in scientific and technical terms?
- Is it based upon international standards and consensus about its validity?
- Can it be linked to economic models, information systems and socio-economic development?
- Is it measurable, i.e. is the data readily available, adequately documented, of known quality and updated at regular intervals?

The WG-ID demanded that the ICZM Progress Indicator should meet as many of these criteria as possible. In fact, despite the 30-or-more-year history of ICZM, there are few examples of strategies, plans or management practices from which to incorporate ideas of a progress indicator [8]. The biggest constraints still seem to be the low level of awareness of the implicit value of coastal systems and the shortage of personnel trained to plan for, and manage, the sustainable use of resources generated by coastal ecosystems [8].

To date, most work on indicators has been done in formulating economic and social policy making. In coastal-related issues, indicators have been increasingly used to monitor certain aspects of environmental quality e.g. the use of nitrate and phosphate loadings for eutrophication [9]. These indicators are all related to measuring the state of the coast i.e. the results obtained as a result of any type of management measures and decisions that have been taken. They have no specific reference to ICZM. Indeed, coastal environmental monitoring has been taking place for decades, long before ICZM methodology came to the fore.

There have been recent attempts to develop an indicator to measure the progress of ICZM in both North America and Europe. There has been a difference of emphasis, with the US developing methodologies to assess individual ICZM projects and Europe attempting to design an indicator that can measure the implementation

of the overall progression of ICZM in a country. This means that a very different approach has had to be taken.

Within Europe, Burbridge [8] has put forward a simple, generic framework for assessing ICZM initiatives which attempts to equate three factors viz. equity, economics and the environment. While the model has value in showing the various interrelationships between the three factors, it is suggested that it is best used to address individual ICZM initiatives. Another attempt was made using ICZM data from selected European countries [10]. This study compared three criteria, horizontal and vertical integration, and public participation, in 181 regions of 14 countries. These three indicators should show progress in ICZM in coastal regions per country since further establishment of ICZM per region should show developments in all these directions. The results were mapped as regional coastal areas (defined as administrative bodies with principal responsibility for spatial and environmental planning) categorised according to whether ICZM was fully or partially established, whether it was in progress or whether there had been little or no progress. The preliminary conclusion was that some progress had been made in ICZM but that it had only been fully established in a few regions. The results were also biased, both positively and negatively, with those countries which have few regional, coastal communities e.g. Belgium (2), Netherlands (5) against those that had more, e.g. UK (49). Of course, any regions that had made progress in areas of ICZM, other than those studied, would show up negatively in the analysis. The study was able to draw some conclusions concerning the state of implementation of ICZM, and the classification used in the study proved to be of operational value. However, the need for a proper quantitative methodology in order to compare ICZM development within a country, over a period of time and between countries was recognised [10].

Henoque [11] has also suggested that there is still a need to develop innovative approaches for measuring the status of an ICZM programme. He favoured the development of seven different indices with a value between 0 and 3 to measure individual case studies. Although they gave good information regarding the strengths and weaknesses of available ICZM tools in local situations, potentially leading to the development of a Good Practice Guide, they still fell short of meaningfully evaluating ICZM progression.

Although the US has a much longer experience with ICZM, only recently have attempts been made in that country, too, to develop a progress indicator. One of the most promising methodologies has been that recently described by Olsen [6]. He has developed a self-assessment questionnaire which reflects the ICZM approach within a wider socio-economic and government (local, regional, national) setting. His concept, provides a means for sorting coastal management initiatives that highlight the experience, capacity, scale and scope of the outcomes that are desired. The most important aspect of Olsen's idea, at least for the development of a more pragmatic model [12], was the recognition that the many actions that have to be undertaken to advance a coastal management initiative have to be organised around the ICZM policy cycle. This model stresses that successive initiatives link the steps within a management cycle.

3. A new model

An indicator set which shows the level of progress being made in the implementation of ICZM has been formulated. It takes the thinking of the complex ICZM management cycle towards much more simplified comparative analysis by evaluating the progress using semi-quantitative criteria. Thus, it recognises that the ICZM cycle can be broken down into a series of discrete ranked actions. These actions, 26 in total, are not completely exhaustive but are comprehensive enough to allow progress in ICZM to be measured.

These actions show what is needed, using a straightforward, step-wise methodology, to pass from a situation where no ICZM is being used to one where it is being fully implemented, by being grouped into a series of five discrete ordered and continuous phases analogous to those of Olsen et al. [13].

The phases are:

Phase I: Non-integrated (often sectoral) coastal management is taking place which can lay the basis for the introduction of ICZM. It contains five discrete actions.

Phase II: A framework for ICZM exists. It contains six discrete actions.

Phase III: Vertical and horizontal integration of administrative and planning bodies exists within an ICZM programme. It contains 10 discrete actions.

Phase IV: An efficient, participatory, integrative planning exists. It contains three discrete actions.

Phase V: There is full implementation of ICZM. It contains two discrete actions.

The actions have been refined further by a number of tests conducted principally by ICZM practitioners at all administrative levels in Spain, France and in the southern North Sea region (including coastal planners and managers from Belgium, France, UK and Holland). Table 1 shows a composite response from several such tests in order to demonstrate the sorts of conclusions that can be drawn and underline the added value of the methodology. Against each action a simple 'yes' or 'no' has been entered for three spatial levels: national, regional and local. However, as it is important to identify a trend through time, a layer of complexity is added at each level by asking respondents to consider the action in two time periods. Each test—in which participants filled in Table 1—helped to clarify the language used in the table and led to a shift in emphasis in the description of some of the actions or, in a couple of cases, to move the action from one phase to another.

The table should be understood both vertically and horizontally. Vertical use will show how far along the ICZM cycle a given authority, agency or area has travelled. The horizontal dimension reveals the degree of integration between the three spatial levels. Further experience should elucidate if any of the actions in the table are unnecessary or of little significance whereas others are more critical to meeting agreed goals. It may also be the case that certain actions in one country or region, or for one authority, have a greater impact than do the same actions in different regions or for other authorities. However, to date, the very act of completing the table in practice, has proven to be an important step in helping to implement ICZM! The debate necessary to decide on an answer, even one as apparently simple as 'yes' or 'no', leads to an exchange of information and opinion about which organisations

Table 1
The indicator set for the measurement of the progress of the ICZM process and how an assessment may look

Phase	Action	Description	National		Regional		Local		Notes
			1995	2000	1995	2000	1995	2000	
I. Laying the basis for ICZM	1	Aspects of coastal management are taking place.	Yes	Yes	Yes	Yes	Yes	Yes	
	2	Decisions about planning and management on the coast are governed by general legal instruments.	No	Yes	No	Yes	No	Yes	
	3	Aspects of the coastal zone, including marine areas, are regularly and routinely monitored.	No	Yes	Yes	Yes	Yes	Yes	
	4	Planning on the coast includes the provision, where appropriate, for the protection of natural areas.	No	Yes	Yes	Yes	Yes	Yes	
	5	Funding is generally available for the implementation of coastal management plans.	No	No	No	No	No	No	
II: A framework for ICZM exists	6	Existing instruments are being adapted and combined to deal with planning and management issues on the coast.	No	No	No	No	No	No	
	7	Ad hoc demonstration projects are being carried out that contain recognisable elements of ICZM.	No	Yes	No	Yes	No	Yes	

Table 1 (*continued*)

Phase	Action	Description	National		Regional		Local		Notes
			1995	2000	1995	2000	1995	2000	
	8	A formal 'state of the coast' report has been written with the intention of repeating the exercise every 5 or 10 years.	No	Yes	Yes	Yes	Yes	Yes	
	9	A coastal management plan, embracing a long-term perspective, has been developed, with relevant issues identified and an implementation strategy drawn up and adopted.	No	No	No	No	No	No	
	10	An ICZM strategy (including the marine environment) has been produced which takes into account both the inter-dependence and disparity of natural processes and human activities.	No	No	No	No	No	No	
	11	A sustainable development strategy is in place which includes the precautionary principle and an ecosystems approach, and which treats coastal areas as distinct and separate entities.	No	Yes	Yes	Yes	Yes	Yes	

III: Vertical and horizontal integration exists between coastal planning and management agencies. Most of the time, decision-making includes relevant stakeholders and coastal communities.	12	All relevant parties concerned in the ICZM decision-making process have been identified and involved.	No	Yes	No	Yes	Yes	Yes
	13	Sufficient human resources, with a specific responsibility for ICZM, are placed at each administrative level from national government to coastal municipality.	No	Yes	No	No	No	No
	14	An adequate flow of relevant ICZM information from the national to the local authority, and back again, is reaching the most appropriate people at each administrative level.	No	No	No	Yes	No	Yes
	15	There is sufficient support and involvement of the relevant administrative bodies, nationally, regionally and locally, to allow and improve co-ordination.	No	No	No	Yes	No	Yes

Table 1 (*continued*)

Phase	Action	Description	National		Regional		Local		Notes
			1995	2000	1995	2000	1995	2000	
	16	Examples of best ICZM practice are available and being used for specific solutions, and flexible measures, to ensure the diversity of Europe′s coasts.	No	Yes	No	No	No	No	
	17	Scientific and technical information is being made available in a form understandable to lay people without losing its coherence and validity.	No	No	No	Yes	No	Yes	
	18	Adequate mechanisms are in place to allow the general public to take a participative and inclusive (as opposed to consultative) role in ICZM decisions.	No	No	No	No	No	Yes	
	19	Routine (rather than occasional) co-operation across local, regional or national boundaries is occurring.	No	No	No	Yes	No	Yes	
	20	An efficient means to resolve conflicts between stakeholders is in place.	No	No	No	No	No	No	
	21	A comprehensive set of indicators is being used to	No	No	No	No	No	No	

		assess whether or not the coast is moving towards a more sustainable situation.						
IV: Efficient, adaptive, participatory, integrative planning and management is in place	22	A long-term financial commitment is in place for the implementation of ICZM.	No	No	No	No	No	Yes
	23	An assessment of progress towards meeting sustainability goals is being made continuously.	No	No	No	No	No	No
	24	Monitoring of the coastal zone sees a positive trend towards greater sustainability of coastal resources, an improvement in the state of the coast and in coastal habitats and biodiversity.	No	No	No	No	No	No
V: Full implementation of ICZM	25	All of the above actions have been implemented with problem areas given special attention.	No	No	No	No	No	No
	26	Re-evaluation of progress in implementing ICZM begins again automatically.	No	No	No	No	No	No

In completing the form, all boxes should be filled in with a 'yes' or 'no' answer with data that is available from the period of the previous assessment. In other words, all answers for the year 2000 will cover the period 1996–2000. It is proposed that the table is completed again at intervals of 3–5 years.
In this composite presentation from a number of tests, the semi-quantitative number of Yes answers (green) can be used to determine the level of progress made in ICZM implementation both temporally and by different ICZM authorities.

and agencies are doing what on the coast, and to what effect. The mechanism encourages concertation both horizontally and vertically.

It is likely that progress in implementing ICZM will be as uneven as Table 1 suggests. Actions need not necessarily take place in sequence. Indeed, it would be surprising if they did. Adapting legal instruments to deal with coastal issues (action 7), for example, appear to be easier to achieve than a comprehensive funding programme (action 6). Again, regular cross-border co-operation (action 19) can precede a formal state of the coast report (action 8). Authorities, States and regions will respond differently to varying pressures. Some will seize an opportunity such as an oil spill or a planning application to construct an offshore wind-farm, and help push ICZM along; others will take a more procedural approach. The nature of ICZM suggests that there will not be blocks of 'Yes' responses followed by blocks of 'No' responses but that the table will be more of a patchwork.

Practical experience suggests that during the first time period or cycle, pioneering authorities or regions might reach well into phase 3 of ICZM implementation but leave a number of 'No' responses in phases 1 and 2. During the second phase, they might complete those actions without going on to phase 4. Each turn of the management wheel will see an increasing number of 'Yes' responses. Those actions answered positively in previous cycles are likely to be of a greater complexity, richness and impact as each cycle passes. A persistence of 'No' responses will suggest a blockage in the system or a problem which will need to be resolved.

What became clear from these tests is that any given person responsible for (aspects of) ICZM will complete the table differently according to their own perspective. Even people working in the same organisation would often differ with their colleagues in assessing whether a particular action is, or is not, being implemented. Therefore, it is important that the assessment be conducted by a group of responsible persons. Furthermore, it is apparent from the testing that local practitioners have restricted information about what, if anything, is happening at regional or national level, and vice versa. However, under the test conditions used, relevant persons from different departments responsible for ICZM sat together, in a workshop setting, and, together with one of the authors, discussed the Action points. Eventually, even with different perspectives, a common consensus answer was reached for each of the points by the authority representatives. Although this is time-consuming initially, those who have experienced the training will themselves be able to act as trainers in any subsequent assessments. It is the intention to hold a number of these training workshops throughout Europe subject to adequate financing.

The new model indicator set described was accepted by the second EU Group of Experts meeting, held in Brussels in June, 2003.

4. Conclusion

Measuring the progress of the implementation of the ICZM cycle alone will not necessarily be indicative of how successful ICZM is in reversing the decline in

Europe's coastal regions. In order to ensure that the ICZM cycle is actually leading to the sustainable use of coastal resources it will also be necessary, therefore, to measure, concomitantly, whether there has been any improvement in the State of the Coast. Only then, with any degree of certainty can it be stated that enhanced implementation of ICZM is leading towards sustainability locally, regionally and nationally. Therefore, any indicator developed to measure the progress of ICZM implementation will need to be augmented with a number of other indicators to measure sustainable development of the coastal zone. The use of these two indicator sets—one measuring progress on implementing ICZM and one measuring sustainable development of the coastal zone—are inextricably linked and should be seen as part of the ICZM cycle. Used together, they can give an indication of the degree to which the implementation of ICZM is correlated with a more sustainable coast. That is, decisions using an integrated approach should see a positive improvement in the state of the coast with concomitant progress towards sustainable development and increased or status quo biodiversity values. The indicators measuring sustainable development will in turn feedback to give policymakers an indication of the need for further action in ICZM.

The model Progress indicator set described, therefore, will not only be a measure of how well EU countries are implementing ICZM but, set alongside indicators of sustainable development or state of the coast, it will be a test of the hypothesis underpinning the EU Recommendation, that ICZM is a prerequisite for a more sustainable coast.

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