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The coastal sustainability standard: A management systems approach to ICZM

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ABSTRACT

This paper presents a systems-based appraisal methodology that has been designed specifically to consider the effectiveness of Integrated Coastal Zone Management (ICZM) initiatives. Since ICZM is defined in terms of achieving sustainable development, any such initiative must therefore be capable of meeting the multiple and often conflicting objectives inherent in this ubiquitous concept. The methodology outlined here is designed to critically review ICZM in order to pinpoint areas of management weakness and determine the likely 'success' of the process. It represents an example of a management system, incorporates both qualitative and quantitative information, and is proposed as a 'Coastal Sustainability Standard' (CoSS). Initial field testing of the methodology has proved successful and shown that the approach holds some efficacy as a means of assessment.

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1. Introduction

Given that sustainability represents the dominant paradigm in environmental resource planning and management, and that integration is seen as a key attribute in achieving effective management, it should come as no surprise to find that Integrated Coastal Zone Management (ICZM) is a process defined in terms of sustainable development. Indeed, numerous definitions attest to the fact, including *inter alia* GESAMP [1]; EC [2]; and, Cicin-Sain and Knecht [3]. This does not preclude individual organizations currently involved in the 'sectoral' management of the coast, by their words or actions, of also aiming to achieve sustainable development; merely that a distinction can be drawn, on the basis of the likelihood of 'success', between the 'sectoral' approach and the more cogent and defined intent of ICZM. If 'success' for ICZM means sustainable development, then the question is how it attempts to achieve this, and, more specifically, how effectively it does so? Ehler [4] refers to "the challenge [for the governance of Integrated Coastal Management] to establish measurement systems able to adequately check the progress of efforts". Such a system he argues would answer two basic needs of coastal governance: accountability and adaptive management. There is thus a requirement for a suitable mechanism to be developed by which coastal sustainability governance may be appraised.

The EC [5] identified two approaches available to carry out such an assessment: one examining the status, parameters or condition of the coastal zone; and one assessing the process and methods used

in governance. In order to address these approaches, as in other areas of resource management, indicators have been suggested as an appropriate methodology, with Morse et al. [6] stating that these [indicator sets] "are increasingly seen as important tools in the implementation of sustainable development". The EU Working Group on Indicators and Data (WG-ID), set up in 2003 to advise on the best way forward for indicator-based assessment of ICZM, has since recommended that both approaches be developed and operated in conjunction with the national ICZM strategies, required of Member States as part of the EU ICZM Recommendation [7].

In terms of the first approach, examining the status of the coastal zone, on the basis of previous work by the Schéma d'Aménagement Intégré du Littoral (SAIL), the WG-ID [8] recommended a list of 27 indicators known as the 'sustainable development indicators'. This set is already operating with data being collected and published in relation to the coastlines and communities bordering the Southern North Sea Area [9]. Though this data is undoubtedly useful and interesting, it should be recognised that the use of indicators in this way can be critiqued on the basis of reductionism; where reductionism refers to the attempt to reduce real life phenomena to the level of single or simple values. This is a problem that is inherent in the nature of indicators; and one that is particularly pertinent when reflecting complex systems where there are multiple and conflicting objectives, such as is the case with coastal sustainability. For example, in considering the SAIL 'sustainable development indicators', how can one equate those 'supporting a dynamic and sustainable economy' with 'protecting, enhancing and celebrating natural and cultural diversity', i.e. between the volume of port traffic (indicator 13) with the effective management of designated sites (indicator 9)? At times the outcomes of these indicators are likely to be mutually exclusive with regard to progressing

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sustainability. Reductionism therefore means that the use of indicators in this way cannot directly aid decision-makers to come up with the most sustainable option. As Bell and Morse [10] state, “the idea of measuring sustainability in absolute, traditional, reductionist terms, as with sustainability indicators, is non-viable. It cannot be done because sustainability itself is not a single thing. Or better, it can be done but it will be done badly, oversimplifying complexity and reducing a variety of relevant and legitimate views and understandings to the dominant mindset of the scientist.” This is not to say that the individual indicators have no value, because clearly they do both in terms of specific parameter analysis and as a means of communication, merely that they should be used very carefully when inferring any meaning as to the state of sustainable development. This is a problem that faces all such sets of ‘sustainability indicators’ and leads one to the conclusion that such an approach does not represent the best means of assessing ICZM.

The alternative identified by the EC [5], to assess the process and methods used in governance, is far more specific in its reference to ICZM and would appear to offer greater efficacy in its approach. Though less work has been done in this regard, a number of process-orientated ICZM appraisal mechanisms have been suggested by Burbridge [11]; Henocque [12]; Olsen [13]; and Pickaver et al. [14], with the latter’s ‘progress indicator’ being developed for, and adopted by, the EU WG-ID. A brief summary of the key elements of these mechanisms is identified in Table 1, along with a critique on what each has brought to the appraisal of the ICZM. Though they have merits in terms of either assessing the quality of the process or the phase of the ICZM process in operation, in total there are still evident weaknesses. Notably, some appear to lack detail whilst others lack a suitable mechanism with which to reduce subjectivity. On top of this, there is still no fully established, implemented or validated way of assessing ICZM initiatives. In order to address these gaps, this paper proposes the adoption of a more systems-based approach to assessment.

‘Systems’ thinking has become increasingly evident in many areas of academic and practical endeavour over recent years, not least in the field of environmental resource management, where a system may be defined as “a set of elements mutually related such that the set constitutes a whole having properties as an entity” [15].

There are ways of thinking about and applying a systems approach, and Bell and Morse [10] have identified a number of holistic methodologies that may be used in order to consider the concept of sustainability. They argue that these can be differentiated according to whether the methodology is either more implicitly or explicitly systemic; and more analytic or descriptive. However, the key characteristics of systems relate to structure and communication. In terms of structure, systems exist in hierarchies, where sub-systems fit into larger systems, and where each level of system in the hierarchy has one or more emergent properties, i.e. properties unique to that level. In terms of communication, elements within systems, and between systems, are connected thus enabling communication and feedback to occur. Clayton and Radcliffe [16] state that the approach “provides a multidimensional framework in which information from different disciplines and domains can be integrated”. In terms of this research, it means that such an approach would allow for the development of joined up methodologies and enable detailed assessments to be made relevant to each system under review.

The efficacy of using a systems approach to consider ICZM is not a new idea and has been acknowledged by a number of authors such as *inter alia* Van der Weide [17]; and, Dronkers and de Vries [18]. However, with some exceptions such as Bell and Coudert [19]; and Marin et al. [20], its application to assessment is still under developed. For example, one approach that is common elsewhere in environmental and resource management but missing from ICZM is that of management systems. Standardized systems such as the EU Eco-Management and Audit Scheme (EMAS) and the International Standards Organization (ISO) 14001 series are now widely acknowledged and of growing importance in the decision-making processes of both government and business.

Other more specific standards include the WWF Standard for Conservation Projects and Programme Management; the Port Environmental Review System; and those developed by the Forestry Stewardship Council (FSC) and Marine Stewardship Council (MSC). These represent useful tools in the analysis and management of their particular sectors and it is proposed that the development of such an approach would be similarly beneficial with respect to ICZM. In particular, it would offer a means by which individual initiatives could be appraised and act as a focus for the

Table 1
Analysis of process-orientated ICZM appraisal mechanisms.

Mechanism and source	Key elements	Critique
Generic Framework for ‘Success’ (Burbridge, 1997)	<ul style="list-style-type: none"> • ‘Success’ defined in terms of sustainable development • Demonstrates interrelationship of social, economic and environmental objectives • Simple holistic graphic representation 	<ul style="list-style-type: none"> • Best applied to individual ICZM initiatives • Graphic model – good for communication • Lacks comparability and detail
Process indicators (Henocque, 2003)	<ul style="list-style-type: none"> • Defined 7 indices against which to assign scores (0–3) dependent upon a series of questions • Uses qualitative indicators to identify strengths and weaknesses in process 	<ul style="list-style-type: none"> • Proposes a Good Practice Guide • Individual indices offer a holistic perspective • Limited scope in scoring mechanism • No reference to ICZM progress but does allow for comparability
Framework for Progress (Olsen, 2003)	<ul style="list-style-type: none"> • Identified Orders of Outcomes leading to sustainable forms of coastal development • Identified 5 steps and indicators to reflect progress against the ICZM policy cycle • Data gathered is based on an ICZM self assessment questionnaire 	<ul style="list-style-type: none"> • Useful description of ICZM governance capacity in relation to indicators • A conceptual and generic tool with the focus on progress but the mechanism for comparability is unclear
The ‘Progress Indicator’ (Pickaver et al., 2004)	<ul style="list-style-type: none"> • Identifies 5 continuous phases of progress and 26 ranked actions in relation to different geographic scales, over 2 time periods • Activities are answered ‘yes’ or ‘no’ by a range of ‘practitioners’ dependent on whether activity is taking place or not • Different colours for ‘yes’ or ‘no’ gives the outcome a visual description 	<ul style="list-style-type: none"> • Useful tool in relating different geographic and administrative scales • Identifies progress over time • Simple and visually effective • Lacks detail • Lacks clarity and objectivity in relation to its methodological approach • Unclear as to the relationship between the ‘sustainable development indicators’ and the ‘progress indicator’

assessment of strategic performance. This paper therefore proposes a ‘Coastal Sustainability Standard’ (CoSS).

2. The development of the coastal sustainability standard

The ‘Coastal Sustainability Standard’ was developed around a framework of principles and criteria, identified as a result of an inductive survey of UK coastal practitioners who were asked as to their understanding of the key theoretical constructs inherent in sustainability. The methodology and results of this survey are discussed elsewhere (Gallagher et al. [21]; Gallagher [22]) and hence will not be reviewed here but textual analysis, using the qualitative software package, Nud*ist 6, revealed six dominant constructs which formed the basis for the development of the standard. The ‘root diagram’, shown in Fig. 1, defines the textual associations identified through this analysis.

The CoSS is detailed in full in the Appendices of this paper. However, it will firstly outline the nature of the principles and criteria used in the CoSS, prior to reviewing the scoring system; the guidelines that were designed in order to maximise the level of objectivity in carrying out the assessment; and the stages involved in operating the mechanism. The outcome of operating the CoSS in two case study coastal partnerships (CPs) will then be discussed.

2.1. Principles and criteria

The six constructs identified in Fig. 1 – planning; participation; communication; integration; responsibility; and, balance – were defined as principles. The survey also informed the development of a set of criteria for each principle; these being identified to fully reflect the scope of the principle in question. It is against these

principles and criteria that an ICZM initiative could be assessed with performance being determined on the basis of the aggregate compliance with each the criterion. The ‘criteria’, though subject to iterative review, may be seen as generic and are not intended to change from one coastal management initiative to another, thereby enabling the CoSS to assess coastal sustainability in a repeatable and equivalent manner. However, each criterion requires suitable ‘performance indicators’ (PIs) to be assigned which are variable, and dependent on the nature of the area and management initiative in question, thereby enabling the system to be flexible.

The first principle, ‘planning’, represents the process by which intentions are stated and detailed proposals made for achieving an end goal. The process is iterative and based on cyclical evaluation, system development, implementation, and monitoring and review. It involves reflection on past actions in accordance with defined goals, enabling change to take place. ‘Good’ planning therefore exhibits characteristics of self-regulation, and command and control. It also develops the structure of the system, and affects the nature and impact of the system boundaries.

Given that the intention is for ICZM initiatives to be considered and assessed against the principle of planning, it would seem evident that all of the ideas previously mentioned should in some way be reflected both in a working definition of the principle and in the criteria selected. The principle of planning was thus defined as “an iterative and detailed process aimed at enabling change through actions developed from reflection and evaluation”. Specific criteria should therefore reflect the following characteristics:

- Spatially specific;
- Temporally related (considering both the past and future);
- Objective;

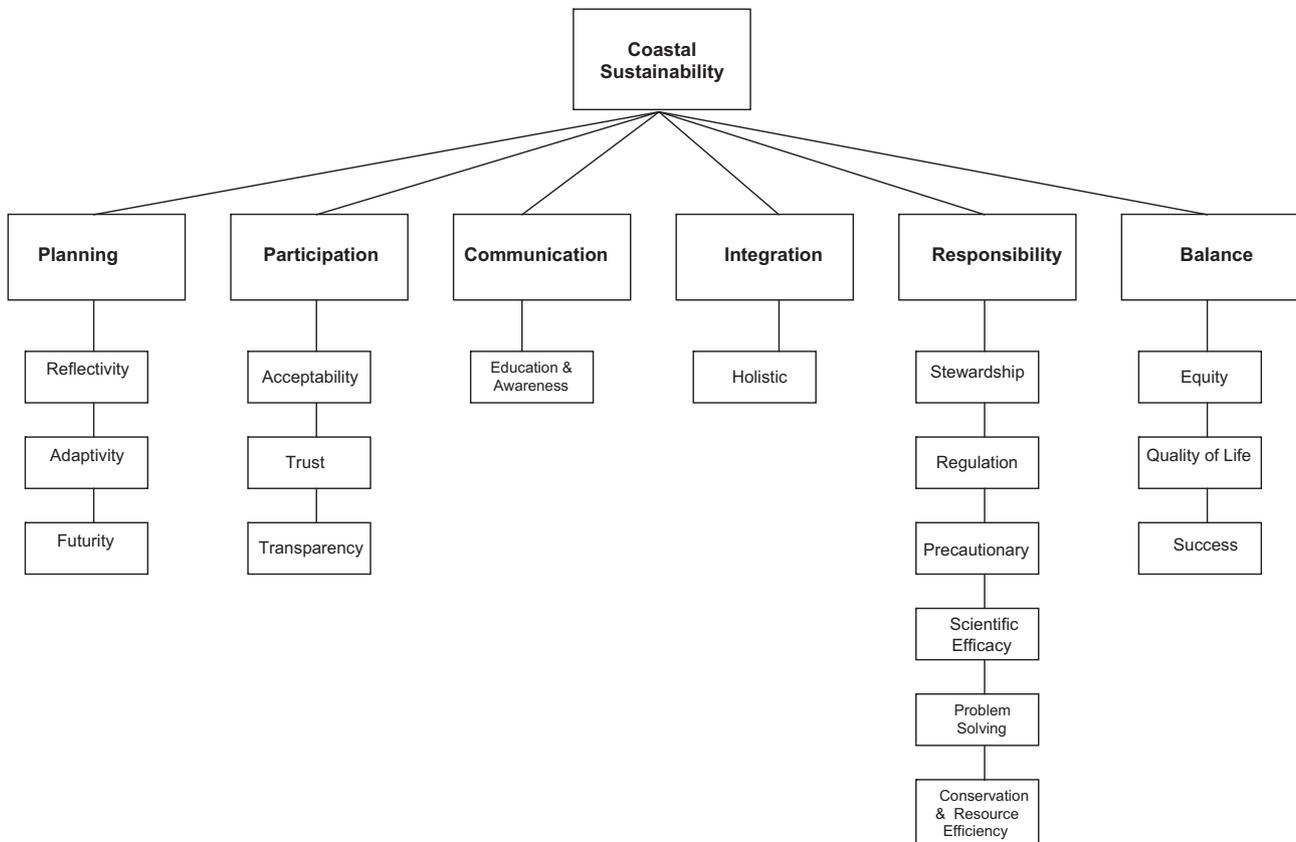


Fig. 1. ICZM sustainability root diagram.

- Performance based;
- Testable; and
- Adaptive and self-regulating.

The second principle, 'participation', refers to the democratisation of the coastal management system in that it relates to the role individuals, groups and organizations play in the decision-making processes. As Clark [23] states, "participation is not intended to change the views [of participants]... nor is it a means to get a particular group or sector 'aligned' to the needs of another group. Participation serves to unite people in open discussion and sharing of needs and ideas and in the working of solutions". It represents therefore a measure of the legitimisation of the process and, if carried out successfully, aids the implementation and enforcement of plans. In terms of the characteristics of systems, participation can be seen as enabling feedback to take place within the system.

The EU ICZM Demonstration Programme [5] identified five levels of participation ranging from the giving of information through to empowerment, where greater freedom of decision-making is facilitated and actions initiated by all stakeholders. Clearly, therefore any assessment of participation should include not only the numbers of stakeholders within a process but also the quality of that involvement, and in particular the degree to which empowerment is achieved. It should be acknowledged that to be successful, this participatory process is one that is on-going and with a consistently positive and proactive level of involvement. In terms of the CoSS therefore, participation is defined as relating to "the role that individuals, groups and organizations in the decision-making process in fostering trust and acceptance of the system". Specific criteria should therefore reflect the following characteristics:

- Diversity of stakeholders;
- Sustainability of involvement;
- Solution based; and
- Transparent.

The third principle, 'communication', represents the general act of imparting information in such a way that understanding is achieved, thus ultimately enabling behaviour and attitudes to change in accordance with the requirements of coastal sustainability. One of the lessons learnt from the EC's Demonstration Programme on ICZM was that "good communication keeps people in the picture; provides opportunities for dialogue, for discussing and resolving problems; and helps to attract and sustain interest to get things done [5]. In order to communicate successfully, and thereby optimise the efficiency of the management system; care needs to be taken in order to communicate the correct message in a language that is appropriate to the target audience since misinterpretation may be difficult to remedy after the event (*ibid.*). The target audience may also comprise a range of individuals and organizations from planners, industrialists, and environmentalists to community groups and other such interested parties. The understanding of the technical issues involved may therefore vary and, as such, the language used be carefully considered. A decision may have to be taken as to whether a 'common' language be developed with which to communicate with all these groups or whether specific messages should be targeted to different groups.

In terms of assessing a management initiative against this principle, communication can thus be defined as "a process enabling capacity building to take place through the effective flow of information". The operation of an up to date, formally organised system of communication using a variety of techniques would appear to offer the best chance of success in this regard. Specific criteria should therefore reflect the following characteristics:

- Diversity of techniques;
- Awareness raising and education goal;
- Effective use of 'language'; and
- Two-way process.

The fourth principle, 'integration', represents a unified and interdisciplinary approach to understanding and management and involves an attempt to avoid fragmentation through achieving greater 'joined-up thinking', and can also be described as being an attempt to operate a more holistic, systems-based approach to management. In this way, as with participation and communication, it represents a means of enabling feedback within the system. McGlashan [24] categorised the concept and recognised four integrative 'directions' that could be applied to management, namely: spatial; temporal; horizontal; and, vertical. Effective application of these directions to coastal management should therefore be seen as enabling a more effective management of coastal sustainability. This 'imperative of integration' [25] then is fundamental to ICZM and represents a yardstick by which it can be assessed [26]. In terms of the CSS, integration is defined as "a unification of understanding and management across boundaries and disciplines". Specific criteria should therefore reflect the following characteristics:

- Different forms of integration;
- Co-ordination of different subject disciplines, i.e. science and management in essence;
- Solution based; and
- Systems-based.

The fifth principle, 'responsibility', refers to the management of the coast being enacted with all 'due care' and with the appropriate use of practical tools and techniques to enable improvements in coastal sustainability. Examples of these include the use of best practicable means, environmental impact assessment (EIA), the precautionary principle, life cycle analysis, and risk assessment and management. The latter is used often in coastal zones in the context of industrial developments and health and safety, but it might be envisaged that this set of techniques could be operated usefully, and more broadly, in relation to ICZM and decision-making. The incorporation of these tools and techniques, along with the central ideas of marine spatial planning and the delivery of a more ecosystem-based approach is currently the subject of debate. In addition to these, it is also considered that other existing tools such as the polluter pays principle could be developed to have a wider applicability and value for ICZM. For example, the scope of this could potentially be broadened to include any negative impacts associated with developments such as a loss of access. Adapting existing tools and techniques in this way, and applying them more broadly to ICZM, could therefore represent a novel and potentially very beneficial approach. In terms of the CSS, the principle of 'responsibility' is defined as "the management of the coast being enacted with all 'due care'". In order to avoid any duplication with the criteria of other principles, measures were taken to focus this principle on the following characteristics:

- Legally based
- Operate, apply and broaden existing management tools and techniques
- Exhibit risk reduction and 'due care'

The last principle, 'balance', is taken to mean the parallel consideration of maintaining the integrity of the natural environment, economic prosperity and an equal opportunity for all people to benefit from a better quality of life. Such a consideration is obviously based on a multitude of value judgements relative to

each scenario and is also conditioned by the attempt to achieve either ‘strong’ or ‘weak’ sustainability [10]. As such, an assessment of this principle should look for an effective process that weighs up such value judgements as well as identifying specific changes in the status of individual areas. In terms of the characteristics of systems, this principle reflects its equilibrium. For the CSS, balance is therefore defined as “management conducted in such a way as to lead to constructive relationships between environmental quality, economic prosperity and social welfare”. Specific criteria should reflect the following characteristics:

- Identify key status quality; and
- Relationship focused.

2.2. The scoring system

In order to operate the CoSS, an ordinal scoring system was designed, as shown in Table 2. Other scales were considered but it was decided that 0–10 was the most appropriate since it reduced the problem of inherent subjectivity, associated with a scale of 0–100, whilst not being too limiting, as with a scale such of 0–3, for example. Since sustainable development is a fuzzy concept open to degrees of interpretation, it was deemed that such a small scale would be insufficient to allow for scoring judgement or scope in criterion evaluation. The 0–10 scale therefore appears to offer enough flexibility to allow for detailed accounting.

The scale has four prescribed and defined points of reference; namely 0, 3, 7, and 10, thereby enabling internal consistency. For a specific case study, each criterion is assessed against this range. Of the two key threshold scores [shown in bold], a score of 7 denotes a mark of achievement either with respect to a specific criterion or for the aggregated mark of the principle as a whole. This score means that the required ‘standard’ has been met and that the management system is operating, in this regard at least, in such a manner as to have a greater chance of fostering sustainable development. The overall requirement for the management system under assessment is to pass each principle, which thus requires that a mean aggregated score of 7 be achieved for all the contributing criteria. A score of greater than 7 simply indicates the degree of excellence employed in that specific management area.

Given that a score of 7 represents the ‘standard’ being met, a score of less than 7 is obviously sub-optimal. However, this is not to say that such management is without value. Indeed, achieving a score of between 3 and 6.9 is seen as showing some evidence of a proactive or positive approach to ICZM, with 3 representing the threshold of such constructive management. Clearly, for any particular management system, aggregated principle scores falling within this range might indicate just one or two elements performing poorly, thereby skewing the score to less than 7, or all of

the criteria performing sub-optimally. The implications of these two situations are that an ICZM initiative is likely to find it easier to affect corrective actions in the case of the former than in the case of the latter, where wholesale changes to its operation may be necessary.

A score of less than 3 is deemed a failure, with any such score automatically highlighting the need for specific corrective action in that area, whether with respect to a specific criterion or the principle as a whole.

2.3. Performance scoring guidelines and guidance notes

In order to maximise the level of objectivity in carrying out the assessment, a set of scoring guidelines were designed for each of the criteria with a guidepost for the four prescribed reference scores.

In terms of interpretation and assessment, clearly many of the criteria, and associated PIs, are relatively straightforward. For example, the first criterion stated under the principle of planning simply asks for evidence of proof as to a spatial boundary, which is then related to natural processes. In other words, if a boundary is stated, does the management area fit in with such natural environmental management units as catchment areas, sediment cells and ecosystems? The extent of consideration and relevance to these natural units thus determines the assessment score. Not all criteria and PIs however are so straightforward and there is recognition that some may be seen as in need of further elucidation. This may come through further iterative development. However, it also reflects the need for further definition and guidance, relating to both the interpretation of what is meant and the evidence necessary to enable the assessment to take place. As such, to improve clarity and transparency, performance guidance notes have been produced though there is insufficient scope to detail these in this paper. Suffice it to say that the guidance notes support the assessment with definitions, interpretation and the identification of possible PIs.

2.4. Operational stages

The operation of the CoSS involves three stages, as follows:

2.4.1. Pre-assessment/scoping exercise

This involves accessing background information on the nature of the coastal management area; outlining the principles and criteria to the relevant authority; and, proposing suitable Performance Indicators (PIs) to apply to each criterion. These PIs may then be reviewed on basis of the nature of area, and their applicability.

2.4.2. Main assessment

This involves accessing the data for the PIs, which may be either qualitative or quantitative in nature, and analysing it in order to assign performance scores. A report can then be written on the basis of the findings, including recommendations with regard to corrective actions and improvements.

2.4.3. Feedback

This involves feeding back the findings and outcomes of the report to the appropriate individuals. The findings should be discussed in order to enable agreement to be made on the final outcomes.

3. Results of operating the coastal sustainability standard

Having developed the CoSS, as shown in the Appendices, the next stage of the research was to validate and critically analyze

Table 2
Scoring system scale and meanings.

Score	Meaning
10	Evidence of exceptional and well developed management technique
9	
8	
7	Standard achievement mark
6	Evidence of some constructive management in operation
5	
4	
3	Threshold of constructive management
2	Failure and requirement for corrective action
1	
0	

the mechanism through application to case study areas. As such, two coastal partnerships (CPs) in the UK, the Exe Estuary Management Partnership (EEMP) and the Tamar Estuaries Consultative Forum (TECF), were selected against which to carry out trial applications of the Standard. Each case study described its aim and *raison d'être* as being to enable and foster a state of sustainable development for their particular jurisdictional areas and, as such, represent suitable ICZM initiatives against which to test the CoSS. Each was audited against the Standard, involving detailed consultation with their respective Coastal Project Officers. It is not the purpose of this paper to give full accounts of these audits, merely to highlight the overall outcomes, with the results of principle assessments being shown in Figs. 2 and 3 respectively. Fig. 4 shows these scores comparatively. It should also be noted that the results were deemed fair and appropriate at the time of survey in 2005.

Given that the operation of the Standard requires that each of the six defining principles should be passed with a minimum mean score of 7, a review of the scoring shows that both failed to meet the requirements of the CoSS, with Table 3 showing the total mean scores for each CP. Only the EEMP managed to achieve a threshold score of 7, and that for just one principle; participation, a principle against which TECF also scored well. There is also a degree of similarity in other areas of scoring also with perhaps the most noticeable being that the principle of responsibility scored lowest for both CPs. These similarities can perhaps be seen as being reflective of the nature of ICZM initiatives in the UK.

4. Evaluation

Since the CoSS has only been operated fully with respect to two case studies, there is evidently still a need for further trials to allow for a fuller evaluation. That said however, the trials to date have produced some interesting results. Given that neither of the CPs achieved the pre-requisite 'standard', a number of questions can be raised as to the efficacy of the CoSS and its operation, as well as to the nature of ICZM in the UK. In order to evaluate the efficacy of the Standard one must consider the mechanics of the CoSS in light of the poor case study performance. With this in mind, a brief evaluation identifies three propositions as being possible:

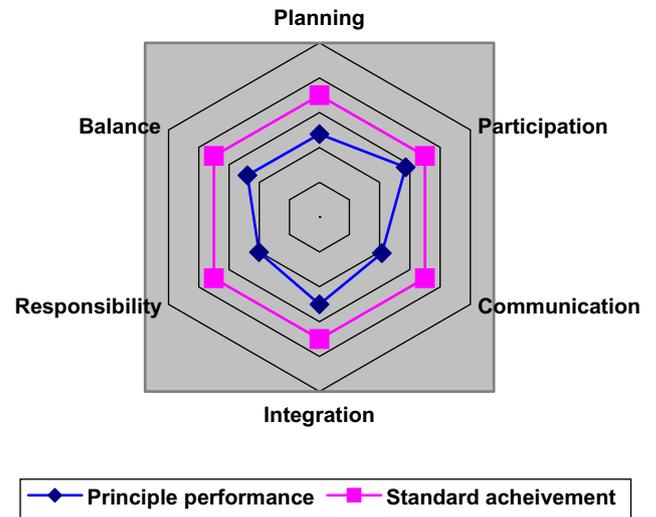


Fig. 3. TECF: Principle performance scores.

1. The Standard fails to accurately reflect ICZM and its stated aim of achieving sustainable development;
2. The scoring mechanism and analysis of the appraisal process are either incorrect or inaccurate; and,
3. There are inherent shortcomings in ICZM that impact on the ability of CPs to achieve their aims.

That 'the Standard fails to accurately reflect ICZM and its stated aim of achieving sustainable development' can be refuted to a certain degree on the basis of geographical specificity. In other words, since the concept of sustainability is considered intensely 'geographical' [27], and the inductive and normative survey upon which the Standard is based was focussed on those involved in UK coastal management, i.e., was geographically specific; it can be concluded that the methodology was appropriate to achieving the outcome. Following on from this, it would clearly be useful if the methodology were trialled against ICZM initiatives outside of the UK in order to further consider this point.

In terms of the second proposition, that 'the scoring mechanism and analysis of the appraisal process might be either incorrect or inaccurate', is certainly a possibility. However, in order to minimise this problem, guidance notes and guidelines have been produced,

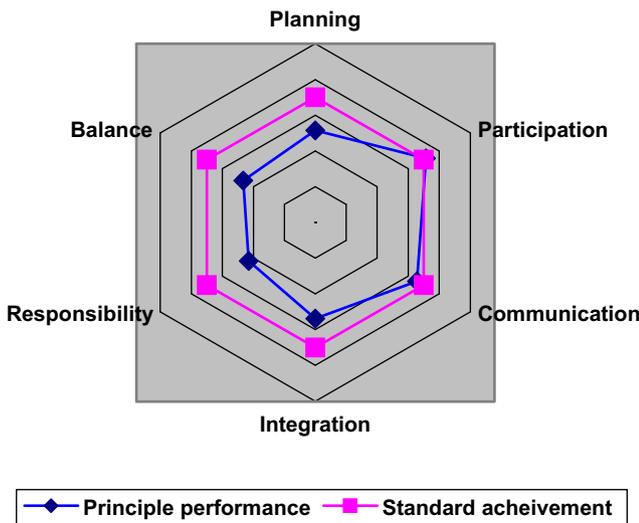


Fig. 2. EEMP: Principle performance scores.

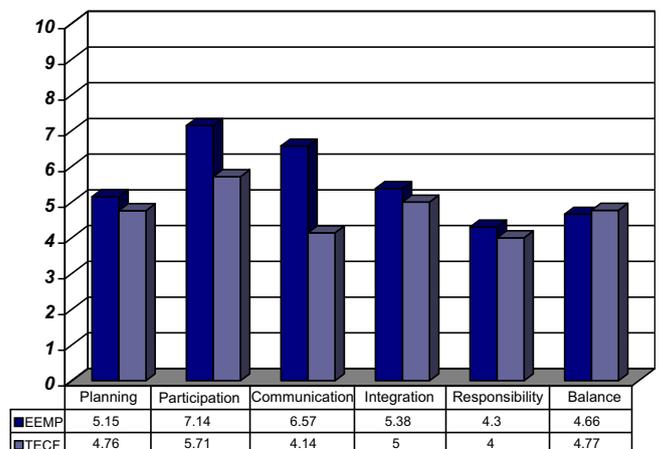


Fig. 4. Principle scores for the case study coastal partnerships.

Table 3
Mean scores of the case study coastal partnerships.

Coastal partnership	Total mean score of the case study
Exe Estuary Management Partnership	5.5
Tamar Estuaries Consultative Forum	4.7

including definitions of terminology, explanations of intent and examples of relevant evidence. The iterative consultation process built into the CoSS operating process is also intended to reduce the problem, with scoring carried out in conjunction with relevant representatives of the ICZM initiatives. On this basis, the scores are intended to be transparent, objective and repeatable. By enabling the CoSS to have such 'external consistency' means that the methodology offers the potential for both comparisons over time as well as between different CPs; the results of which can then be represented graphically to enhance communication. Since there is currently no established strategic review process with which to judge the detailed performance of CPs, this is seen as a key beneficial outcome of this research. However, it is acknowledged that in order to fully evaluate transparency, objectivity and repeatability there is a need for further trials of the methodology to be carried out by independent operators.

Given the first two arguments, the third proposition is that poor performance must be a result of 'inherent shortcomings in ICZM that impact on the ability of CPs to achieve their aims'. Consideration of this identified shortcomings as related to both the structural barriers facing ICZM, and an apparent lack of resources necessary for the CP to operate successfully. In the case of the former, the issues can be specifically seen as characteristic of a voluntary ICZM process, whereby there is no joint responsibility or collective liability incumbent upon the participant stakeholders to achieve the CPs' aspirations. This lack of joint responsibility could lead to any one of several outcomes, which would consequently act as barriers to success. These include the following:

- That not all relevant stakeholder constituencies and jurisdictions are included within the ICZM process;
- That the necessary cultural changes within the stakeholder organizations are not adequately developed; and,
- That appropriate individual contributions to the ICZM process are not encouraged sufficiently.

In the case of resource issues, the 'hand to mouth' funding existence of CPs in the UK might also be considered to be directly resultant of the voluntary approach, with ICZM initiatives having to focus a disproportionate amount of time on accessing finance rather than on more specific ICZM aims and objectives. Since funding tends to be short-term, it also means that there is a disparity between achieving short-term and long-term aims with funding tied more to achieving the former than the latter. As such, it can be concluded that ICZM in the UK currently exhibits a disjointed approach to achieving long-term goals as a result of its voluntary nature. With respect to the CoSS, there is an acknowledgement that operating such a Standard would also only add to the pressures of time and resources facing CPs and with this in mind it is considered likely that rather than being an annual event, the CoSS should be operated as part of a strategic review of the CP. It is considered that an appropriate timeframe for such a review would most obviously relate to the management plan, and hence most probably be carried out every 5 years. In this sense, the CoSS would act not only as a means of assessment and comparison but could also as a guide for best practice.

The general issue of funding and resources is also likely to have an impact on the performance of the CP in terms of affecting the 'professional skills' available within the CP. For example, skills relating to such tools and techniques as management systems, risk assessment, life cycle analysis and auditing are employed widely in environmental and resource management but have not been to any great extent been used in coastal management initiatives, with the result that their role in ICZM is still marginal. This is reflected in the results of the case study CPs, where both the EEMP and TECF scored poorly against the principle of responsibility. The slow or non-existent uptake of these tools, techniques and approaches within the CPs might be explained by the fact that they are not deemed useful or relevant to coastal management. However, it is considered more likely that their absence results more from a lack of awareness, knowledge or skills amongst coastal managers, in addition to poor funding, rather than any perceived lack or worth. In highlighting this point, the research may be seen as helping to initialise a debate relating to the professional skills and competencies required of ICZM.

5. Conclusion

The Coastal Sustainability Standard is designed to act as a strategic review tool to assess the effectiveness of ICZM and is intended to represent an approach to sustainability appraisal that is both spatially and temporally repeatable, i.e. one that would enable a comparative audit to be taken and analyzed on a periodic basis for a variety of different coastal areas. Developed from a normative and inductive survey, the CoSS is based on a framework of principles and criteria from which relevant performance indicators are derived, and for which both qualitative and quantitative information can be incorporated to enable a graphic representation of 'success' against an agreed standard.

Though undoubtedly in need of further validation, the development and application of the CoSS have been shown to offer some efficacy as a means of assessment and, given the number of relevant policy initiatives currently underway, contributes to the debate about the way forward for ICZM appraisal. In addition, as an example of systems thinking, it can be employed in conjunction with other relevant mechanisms, both vertically and horizontally; a characteristic that can be seen as being a major benefit of the approach.

In testing the CoSS, the research to date identified a number of weaknesses that are apparent in the voluntary approach to ICZM, as practised in the UK. Notable amongst these are a potential lack of collective liability; poor funding; and a question as to the appropriate professional skills and competencies required of ICZM. Assuming that ICZM is considered to be a beneficial approach to managing the coast, these areas would need to be addressed for long-term progress to be made. In highlighting these general points, the CoSS also offers the means to enable far more specific analysis to be carried out and as such can add value to the management process of individual initiatives, not least as a guide for good practice.

Acknowledgements

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Appendix 1. The planning principle.

Scoring criteria	Scoring guidepost 0	Scoring guidepost 3	Scoring guidepost 7	Scoring guidepost 10
<i>Criterion 1: The management system is consistent with the nature and scale of the coastal area</i> Is the management system clearly and spatially defined in relation to relevant natural processes?	No specific or clearly marked spatial boundary exists or is considered.	The spatial area has been considered though is not clearly defined.	The spatial area is defined clearly but is not fully relevant to all natural processes.	The spatial area is clearly defined and fully relevant to all natural processes.
<i>Criterion 2: The management system is consistent with the cultural context of the coastal area</i> Is the management system clearly and spatially defined in relation to the relevant cultural context?	No specific or clearly marked spatial boundary exists or is considered.	The spatial area has been considered though is not or clearly defined.	The spatial area is defined clearly but is not fully relevant to the cultural context.	The spatial area is clearly defined and fully relevant to the cultural context.
<i>Criterion 3: The management system is clearly defined with individuals and organizations having clear lines of responsibility and interaction</i> Is there a clear management structure identifying organizations, individuals and responsibilities?	There is no clear or coherent management structure in place.	Relevant individuals and organizations are known though responsibilities and relationships are not developed.	Individuals and organizations with management responsibility have been defined including key areas of responsibility and interaction.	The management structure is clearly stated. Individuals and organizations with management responsibility are clearly defined including all areas of responsibility and interaction.
<i>Criterion 4: The management system operates with reference to a comprehensive range of relevant baselines</i> Does the management system operate with reference to a comprehensive range of relevant baselines?	The management system does not have an understanding of the relevant baselines.	The management system bases its decisions and planning on an understanding of the area but baselines are rarely considered.	The management system bases its decisions and planning on an understanding of the area. Baselines are considered when available.	The management system bases its decisions and planning on a clear and comprehensive understanding of the area. All decisions and planning are referenced to appropriate baselines.
<i>Criterion 5: The management system takes a far-sighted view</i> Does the management system take a clear far-sighted view?	The system does not have a far-sighted view	Long-term aims are implicit within the system.	The system contains clearly stated long-term aims.	The system contains clearly stated long-term aims and a management 'vision' is explicit.
<i>Criterion 6: The management system contains short-term and long-term objectives</i> Does the management system clearly contain both short (operational) and long-term (quality) objectives?	No system objectives are stated.	Short-term objectives are stated. Timeframes may be inappropriate.	Short-term and long-term objectives are stated.	A comprehensive range of short-term and long-term objectives are stated in relation to appropriate timeframes.
<i>Criterion 7: Objectives are focussed on the most significant issues facing coastal sustainability</i> Are the objectives systematically identified in relation to their significance?	No system objectives are stated.	System objectives are not identified using any clear methodology and do not relate to significance.	System objectives are identified using an appropriate methodology but do not clearly relate to significance.	System objectives are identified using an appropriate methodology and clearly relate to their significance.
<i>Criterion 8: Operational procedures exist for meeting objectives</i> Are procedures and methodology clearly stated and appropriate to meeting the objectives?	Operational procedures are neither stated nor in place to meet objectives.	In order to meet the objectives, a range of procedures are stated though not all are operating.	In order to meet the objectives, procedures are stated with the majority working effectively.	Procedures are clearly stated, comprehensive, appropriate and effective.
<i>Criterion 9: Procedures are in place for measuring performance relative to objectives</i> Are procedures in place for measuring performance relative to the objectives?	No procedures are in place for measuring performance relative to objectives.	Procedures for measuring performance relative to some objectives are stated though ill defined. Information gathered lacks detail.	Procedures for measuring performance relative to all objectives are clearly stated. Information gathered may lack sufficient detail.	Tested procedures for measuring performance relative to all objectives are clear and appropriate. Information gathered is comprehensive and detailed.
<i>Criterion 10: The management plan is clearly linked to a system of feedback and iterative reflection</i> Does the management structure include a system of feedback and reflection relating to performance?	There is no evidence of a system of feedback and reflection.	A system of feedback and reflection is implicit, ill defined and ad-hoc.	A system of feedback and reflection clearly exists but is ill defined.	A clear and well-defined system of feedback and reflection exists.
<i>Criterion 11: The management process is adaptive</i> Can the management system adapt quickly and effectively in the light of either changing events or poor performance?	There is no evidence of the management system behaving adaptively.	The system is slow to adapt to changing events and poor performance.	The system is adaptive with some evidence to show adaptation within reasonable timeframes.	The management system is evidently highly adaptive and responsive to making appropriate and comprehensive changes.

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Appendix 1 (continued)

Scoring criteria	Scoring guidepost 0	Scoring guidepost 3	Scoring guidepost 7	Scoring guidepost 10
<i>Criterion 12: The management system is effectively audited on a regular and periodic basis</i> Do competent individuals audit the management system on a regular and periodic basis?	The management system is never audited.	The system is not audited but there is consideration given to system effectiveness.	The system is audited in an ad-hoc fashion.	Responsible and skilled persons audit the system on a regular and periodic basis.
<i>Criterion 13: The management has a commitment to continually improve performance?</i>	There is no evidence of a commitment to continually improve.	The system has an implicit desire to continually improve its performance.	The system is committed to continually improving its performance.	The system has a clearly defined commitment to improve its performance.

Appendix 2. The participation principle.

Scoring criteria	Scoring guidepost 0	Scoring guidepost 3	Scoring guidepost 7	Scoring guidepost 10
<i>Criterion 1: An appropriate range and diversity of stakeholders engage with the management process</i> Are all the stakeholders perceived as being relevant to the area included within the management system?	The management system does not include stakeholder groups.	A range of stakeholder groups participate in the management process.	All key stakeholder interests engage fully with the management process.	All stakeholder interests engage fully with the management process, including all key stakeholders.
<i>Criterion 2: Stakeholders understand their role and responsibility within the management process</i> Do stakeholders know their role within the management structure?	Confusion exists amongst stakeholders as to their role within the management system.	Some stakeholders are not fully aware of their role and responsibility within the management structure and make a minimal contribution.	Most stakeholders, including all key ones, are aware of their role and responsibilities within the management structure and play an active role.	All stakeholders are aware of their role and responsibilities within the management structure and play an active and constructive role.
<i>Criterion 3: The system of decision-making is transparent</i> Do stakeholders fully understand the planning and decision-making process?	There appears to be no attempt made to make the system transparent to stakeholders.	Some attempts have been made to make the system transparent but it is nevertheless complicated and has not been fully achieved.	Proactive attempts are made to explain the planning process and most individual decisions. These are understandable to most stakeholders.	The system of decision-making and planning is fully transparent and easily understandable to all stakeholders.
<i>Criterion 4: There is a participatory process of conflict resolution</i> Is there an appropriate mechanism for the resolution of disputes within the system?	There is no evidence to suggest that attempts have been made to resolve conflicts or develop understanding.	A programme is being developed to foster understanding and to allow for conflict resolution within the system.	There is a mechanism to foster understanding and to allow for conflict resolution within the system. This has not always acted successfully.	There is an appropriate and tested mechanism for the resolution of disputes between stakeholders. All stakeholders fully understand and have empathy for the points of views of others.
<i>Criterion 5: There is minimal tension between 'top-down' decision-making and 'bottom-up' aspirations</i> Are there good working relationships between the statutory empowered regulators and other stakeholder groups?	Non-constructive relationships exist between 'top-down' and 'bottom-up' approaches.	'Difficult' working relationships exist between the statutory empowered regulators and other stakeholder groups with regard a number of key management issues but attempts are being made in order to foster improvements in these.	'Good' working relationships exist between the statutory empowered regulators and other stakeholder groups with regard all of the key management issues.	'Good' working relationships exist between the statutory empowered regulators and other stakeholder groups with the regard all management issues.
<i>Criterion 6: There is an active system of stakeholder review and feedback</i> Is there a formal and explicit process available by which stakeholders can raise issues or problems?	There is no system of stakeholder review.	There is no explicit or formal system of stakeholder review but stakeholders are empowered to raise issues when the need arises.	There is a formal and periodic system of key stakeholder review.	There is a holistic and formal system of stakeholder review on a periodic basis. All stakeholders are empowered to raise issues as and when the need arises.
<i>Criterion 7: Decision-makers are accountable for their actions</i> Are decision-makers accountable for their actions?	Decision-makers are not accountable for their actions.	Decision-makers are implicitly accountable for their actions to key stakeholders and therefore make attempts to explain management outcomes.	Decision-makers are explicitly accountable for their actions to key stakeholders and make regular attempts to explain management outcomes.	Decision-makers are formally and explicitly accountable for their actions to all stakeholders and make regular attempts to justify management outcomes to the wider public.

Appendix 3. The communication principle.

Scoring criteria	Scoring guidepost 0	Scoring guidepost 3	Scoring guidepost 7	Scoring guidepost 10
<i>Criterion 1: Stakeholders and the community at large have easy access and opportunity to relevant coastal information and education</i>				
Is there easy access to relevant coastal information from a variety of different sources?	No system of information dissemination is in operation.	A system of dissemination using either low tech or hi tech methods operates on an ad-hoc basis.	An effective system of dissemination operates using either low tech or hi tech methods.	An effective and up to date system of dissemination operates using both low tech and hi tech methods.
<i>Criterion 2: Information presented through the dissemination system is easily understood and interpreted correctly by different stakeholders</i>				
Do stakeholders understand the information that is being passed to them?	No system of information dissemination is in operation.	Some stakeholders do not understanding the information that is communicated to them.	Some stakeholders do not understanding the information that is communicated to them. However, there are accessible means by which issues can be clarified.	All stakeholders clearly understand the messages and information that is passed to them.
<i>Criterion 3: The general public are fully aware of the management process and see its relevance</i>				
Is the management process known and understood by the community at large?	The general public are not aware of the management system.	The general public are aware there is a management process at work but not specifically what it does, how it operates or what it tries to achieve.	The general public are aware there is a management process at work and what it is trying to achieve.	The general public fully understand the management process and what it is trying to achieve and are supportive of its efforts.
<i>Criterion 4: A comprehensive range of stakeholders are fully aware of issues pertaining to coastal sustainability</i>				
Do stakeholders understand the coastal sustainability issues relating to the area?	Stakeholders are unaware of the general issues relating to coastal sustainability.	Stakeholders are aware of the general issues relating to coastal sustainability but do not understand them fully.	Stakeholders understand the general issues relating to coastal sustainability.	Stakeholders fully understand the issues relating to coastal sustainability and how this applies to their local area.
<i>Criterion 5: Indicators are used for presenting and interpreting information on environmental quality to a comprehensive range of stakeholders</i>				
Are sustainability indicators used as a means by which information can be presented to both stakeholders and the community at large?	No such information is either collected or presented.	Information is collected and indicators are presented on an ad-hoc basis.	Information is collected and indicators are presented on a regular and periodic basis. Some but not all information is interpreted.	Information is collected and indicators are presented on a regular and periodic basis, the implications of which are fully explained.
<i>Criterion 6: An outreach system of coastal sustainability education operates effectively</i>				
Does the management process feed relevant coastal information to a range of educational groups?	There is no attempt to educate the wider community about coastal sustainability.	There is an informal educational input into a range of relevant groups and organizations.	There is a formal educational input into a range of relevant groups and organizations.	The process actively seeks to develop educational material, operates its own educational mechanisms and feeds formally into a range of relevant groups and organizations.
<i>Criterion 7: Communication is seen and operated as a two-way process</i>				
Is the flow of information seen and operated as a two-way process?	No active communication process exists.	The system operates an effective information dissemination process.	The management views communication as a two-way process and disseminates effectively but has no effective formal means of receiving responses.	The management views communication as a two-way process, disseminating and receiving information and responses formally and effectively.

Appendix 4. The integration principle.

Scoring criteria	Scoring guidepost 0	Scoring guidepost 3	Scoring guidepost 7	Scoring guidepost 10
<i>Criterion 1: Interactive, problem-solving techniques are employed in the analysis of relevant issues</i>				
Are interactive, problem-solving techniques employed when analysing relevant issues?	No analytical problem-solving techniques have been considered or are employed.	Problem-solving is considered as an approach but with little evidence of its use.	Problem-solving techniques are employed to analyze some issues.	Comprehensive problem-solving techniques are employed to analyze all appropriate issues.
<i>Criterion 2: The management of the coast takes into account the impact of decision-making on its boundaries</i>				
Does the management process take into account the impact of policies and decision-making on its boundaries?	No consideration has been given to the relevance of boundaries or to the impact of policies and decision-making on them.	Management takes into account and reviews the impact of its policies and decisions on its boundaries.	Management takes into account and reviews the impact of its policies and decisions on its boundaries and acts to minimise negative aspects.	Management takes into account the impact of all decisions on its boundaries and acts purposefully to minimise negative aspects.
<i>Criterion 3: Vertical policy components fully accord with one another</i>				
Is there a consistent accord between vertical policies?	There is no obvious accord between vertical policies.	Implied but not explicit vertical links can be drawn between policies.	A variety of implicit and explicit vertical links can be drawn between policies.	All vertical links relevant to coastal management are explicit within policies.

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Appendix 4 (continued)

Scoring criteria	Scoring guidepost 0	Scoring guidepost 3	Scoring guidepost 7	Scoring guidepost 10
<i>Criterion 4: Horizontal policy components fully accord with one another</i>				
Is there a consistent accord between horizontal policies?	There is no obvious accord between horizontal policies.	Implied but not explicit horizontal links can be drawn between policies	A variety of implicit and explicit horizontal links can be drawn between policies.	All horizontal links relevant to coastal management are explicit within policies.
<i>Criterion 5: The ICZM process shows evident moves to develop a perceived and inherent equality between relevant disciplines</i>				
Is there a transparent and strategic attempt to operate equality between different management units, Sectors and disciplines?	There has been no attempt to operate or develop equality between the relevant disciplines in the management process.	Sectors are considered independently within the management process but with effective communication between them.	Sectors are considered independently within the management process but take some transparent action to synchronize their work towards meeting common objectives.	Formal and transparent mechanisms operate in which different Sectors are considered and through which work is synchronized towards meeting common objectives.
<i>Criterion 6: There is evidently a creative relationship between science and management: between those who collect and prepare evidence and those who act and are responsible for decision-making</i>				
Is science enabled and playing an effective role in achieving coastal sustainability?	The system makes no attempt to enhance the role and contribution of science in achieving coastal sustainability and there is no input from the scientific community into the decision-making process.	The role of science is considered in ICZM but with limited evidence of success. Research is not generated by the coastal management needs.	The role of science is considered in ICZM and there is clear evidence of cooperative working.	Management has a synergistic relationship with the scientific community. The scientific community are advised as to management needs and have a formal and constructive influence on decision-making.
<i>Criterion 7: Resources are focussed on facilitating greater integration</i>				
Does resource allocation enhance the potential for integration?	There is no evidence of resources being allocated to enable greater integration.	Resource allocation has not operated explicitly to enable further integration but some enhancement has occurred.	Resource allocation has taken some explicit and transparent steps to enhance integration.	Resource allocation is explicitly focussed on the enhancement of integration in all areas.
<i>Criterion 8: There are continued improvements in integration</i>				
Is there evidence of continuing improvements in integration?	There is no evidence of integration occurring.	There is evidence of integration occurring but not that there is on-going or continual improvement.	There is evidence of both integration occurring and that there is some continual improvement.	Integration is a core focus of the management system and there is strong evidence of on-going improvements taking place.

Appendix 5. The responsibility principle.

Scoring criteria	Scoring guidepost 0	Scoring guidepost 3	Scoring guidepost 7	Scoring guidepost 10
<i>Criterion 1: The management system has a clear legal basis</i>				
Does the management system have a clear legal basis?	The management system has no legal basis and no evidence to show legal compliance.	The management system operates legally but without being legally defined.	The management system operates legally and for some particular issues operates as a legally defined entity.	The management system operates legally and operates wholly and comprehensively as a legally defined entity.
<i>Criterion 2: The coastal environment is regulated effectively</i>				
Is evidence available to prove that the coastal environment is being regulated effectively?	Information is not available.	Information is available but inconclusive.	Information is available and shows some environmental improvements over the last 5 years.	Information is available showing consistent and comprehensive environmental improvements over the long-term.
<i>Criterion 3: Organizations and institutions involved in ICZM promote stewardship and resource efficiency</i>				
Does ICZM promote stewardship and resource efficiency?	Resource efficiency is not agreed as a driving principle behind the management process and there is no clear evidence to show its promotion.	Resource efficiency is an implied principle of the management process. There is some limited evidence of its operation.	Resource efficiency is agreed to as a driving principle of the management process and there is some evidence of its operation.	Resource efficiency is agreed to as a driving principle of the process and there is comprehensive and transparent evidence of its operation.
<i>Criterion 4: The coastal management system uses the best practicable means with which to achieve its objectives</i>				
Can the management system show evidence of operating the best practicable means in carrying out its actions?	The best practicable means is not agreed as a driving principle behind the management process and there is no evidence to show its operation.	The best practicable means is an implied principle of the management process. There is some limited evidence of its operation.	The best practicable means is agreed to as a driving principle of the management process and there is some evidence of its operation.	The best practicable means is agreed to as a driving principle of the management process and there is clear evidence of its operation.
<i>Criterion 5: The management system evidently employs a 'precautionary approach'</i>				
Can the management system show evidence of operating the precautionary principle?	The precautionary principle is not agreed as a driving principle behind the management process and there is no clear evidence to show its operation.	The precautionary principle is an implied principle of the management process. There is some limited evidence of its operation.	The precautionary principle is agreed to as a driving principle of the management process. Operational procedures exist which can be used to implement a precautionary approach.	The precautionary principle is agreed to as a driving principle of the management process. Operational procedures exist to implement a precautionary approach and there is clear evidence of their operation.

Appendix 5 (continued)

Scoring criteria	Scoring guidepost 0	Scoring guidepost 3	Scoring guidepost 7	Scoring guidepost 10
<i>Criterion 6: The management system evidently applies the 'Polluter Pays Principle'</i>				
Does ICZM show evidence of operating the PPP in carrying out / enforcing its actions?	The PPP is not agreed as a driving principle behind the management process and there is no clear evidence to show its operation.	The PPP is an implied principle of the management process. There is some limited evidence of its operation.	The PPP is agreed to as a driving principle of the management process. Operational procedures exist to implement the PPP and there is some evidence of their operation.	The PPP is agreed to as a driving principle of the management process. Operational procedures exist to implement the PPP and there is clear evidence of their operation.
<i>Criterion 7: The risks to sustainability associated with ICZM policies and decision-making is as low as reasonably practicable</i>				
Can the management system show evidence of carrying out risk assessments in relation to its policies and decisions?	Risk assessment is not agreed as a driving principle behind the management process and there is no clear evidence to show its operation.	Risk assessment is an implied principle of the management process. There is some limited evidence of its operation.	Risk assessment is agreed to as a driving principle of the management process. Operational procedures exist which can be used to implement risk assessment and there is some evidence of their operation.	Risk assessment is agreed to as a driving principle of the management process. Operational procedures exist with which to carry out risk assessments and there is clear evidence of their operation.
<i>Criterion 8: The management system gives due consideration to the life cycle and impact of coastal activities</i>				
Can the management system show evidence of carrying out life cycle analysis in relation to its policies and decision-making?	LCA is not agreed as a driving principle behind the management process and there is no clear evidence to show its operation.	LCA is an implied principle of the management process. There is some limited evidence of its operation.	LCA is agreed to as a driving principle of the management process. Operational procedures exist which can be used to implement LCA and there is some evidence of its operation.	LCA is agreed to as a driving principle of the management process. Operational procedures exist which can be used to implement LCA and there is clear evidence of their operation.
<i>Criterion 9: There is a sufficient budget for the management system to operate successfully</i>				
Is there an appropriate resource budget available for the successful operation of the management system?	There is an insufficient budget available for the operation of the management system to achieve relative success.	A budget is available for the operation of the management system that is sufficient to achieve relative success with respect to its short-term goals.	A budget is available for the operation of the management system that is sufficient to support and achieve all its short-term goals.	A budget is available for the operation of the management system that is sufficient to support and achieve both its short-term and long-term goals successfully in absolute terms.
<i>Criterion 10: Management adopts an ecosystem approach to operating</i>				
Is there an attempt to adopt an ecosystem approach to management?	The ecosystem approach has not been considered in relation to the management of the coastal area.	The ecosystem approach is being viewed in a constructive manner but with little evidence of its operation.	The ecosystem approach is being viewed in a constructive manner. There is some evidence of its operation.	The ecosystem approach is being operated in a comprehensive manner.

Appendix 6. The balance principle.

Scoring criteria	Scoring guidepost 0	Scoring guidepost 3	Scoring guidepost 7	Scoring guidepost 10
<i>Criterion 1: ICZM conserves, protects and restores the health and integrity of coastal ecosystems</i>				
Does coastal management conserve, protect and restore the health and integrity of coastal ecosystems?	ICZM has no commitment to environmental conservation or ecosystem restoration.	ICZM has an implicit commitment to environmental conservation and ecosystem restoration. There is some limited evidence of its operation.	ICZM has an explicit commitment to environmental conservation and ecosystem restoration. Procedures exist which can be used to implement this and some evidence of success in its operation.	ICZM has an explicit commitment to environmental conservation and ecosystem restoration. Procedures exist which can be used to implement this, with comprehensive evidence of enacting this commitment and success in its outcomes.
<i>Criterion 2: Environmental and economic policies and decision-making takes into account social 'fairness'</i>				
Does coastal management have a commitment for environmental and economic decisions to take into account 'social fairness'?	There is no commitment to accept social 'fairness'.	ICZM has an implied commitment to social 'fairness'. There is some limited evidence of its operation.	ICZM has an explicit commitment to social 'fairness'. Operational procedures exist which can be used to implement and consider social 'fairness' and some evidence of its operation.	ICZM has an explicit commitment to social 'fairness'. Operational procedures and measures exist which can be used to implement and consider social 'fairness' with comprehensive and transparent evidence of enacting this commitment and success in its outcomes.
<i>Criterion 3: ICZM protects and enhances optimum environmental quality with regard to its impact upon employment and income</i>				
Does coastal management protect and enhance optimum environmental quality with regard to its impact upon employment and income?	ICZM does not consider environment quality with regard to its impact on employment and income.	ICZM has an underlying acceptance of this as a requirement in its actions and some limited evidence to support its operation.	ICZM has a commitment to consider environmental quality with regard to its impact on employment and income. Procedures exist which can be used to implement this and some evidence of its operation.	ICZM has an explicit commitment to consider environmental quality with regard to its impact on employment and income. Procedures and measures exist which can be used to implement this, with comprehensive evidence of enacting this commitment effectively.

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Appendix 6 (continued)

Scoring criteria	Scoring guidepost 0	Scoring guidepost 3	Scoring guidepost 7	Scoring guidepost 10
<i>Criterion 4: ICZM conserves and maintains cultural heritage</i> Does ICZM seek to maintain the cultural heritage of the area?	ICZM has no commitment to conserve or maintain cultural heritage.	ICZM has an implicit commitment to conserve cultural heritage. There is some limited evidence of its operation and success.	ICZM has an explicit commitment to conserve cultural heritage. Procedures exist which can be used to implement this and there is some evidence of its operation and success.	ICZM has an explicit commitment to conserve cultural heritage. Procedures and measures exist which can be used to implement this, with comprehensive evidence of enacting this commitment effectively.
<i>Criterion 5: ICZM improves the equity of coastal communities and maintains development options and opportunities for generations to follow</i> Does ICZM have a commitment or intention to maintain and improve equity?	ICZM does not accept equity as a commitment.	ICZM has an implicit commitment to intra and inter-generational equity. There is limited evidence of enacting this commitment	ICZM has an explicit commitment to intra and inter-generational equity. Procedures exist which can be used to implement this and there is some evidence of its operation and success.	ICZM has an explicit commitment to intra and inter-generational equity. Procedures and measures exist which can be used to implement this, with comprehensive evidence of enacting this commitment effectively.
<i>Criterion 6: ICZM optimises the 'quality of life'</i> Does ICZM attempt to improve the 'quality of life'?	ICZM neither assesses nor considers the 'quality of life'.	The 'quality of life' is implicitly seen as an important aspect of ICZM but there is no system of assessment	The 'quality of life' is an active consideration for the management system and despite not being regularly assessed, surrogate indications are considered generally favourable	The 'quality of life' is regularly assessed and showing relative improvements over time
<i>Criterion 7: Temporal variations in the coastal system are effectively managed</i> Is apparent seasonality managed effectively?	There is a highly marked seasonality in the coastal system but this is not considered by the management system.	The management system considers some aspects of coastal seasonality and is concerned with mitigating any negative impacts.	The management system considers coastal seasonality and is actively seeking to redress any negative impacts. Some improvements are evident.	The management system considers coastal seasonality and is actively seeking to redress any negative impacts. This is evidentially and comprehensively successful.
<i>Criterion 8: Policies and decisions are made through negotiation with due consideration being given to the relative importance of environmental, social and economic interests</i> ICZM considers and negotiates the consequent costs and benefits for environmental quality, social welfare and economic growth?	ICZM makes no attempt to consider or negotiate relative costs and benefits of environmental quality, social welfare and economic growth.	ICZM is empowered to consider the relative costs and benefits of environmental quality, social welfare and economic growth. There is some limited evidence of success in achieving constructively negotiated decisions.	ICZM actively considers the relative costs and benefits of environmental quality, social welfare and economic growth. There is some evidence of success in achieving constructively negotiated decisions.	ICZM actively considers the relative costs and benefits of environmental quality, social welfare and economic growth, and elicits a constructively negotiated and aggregated decision in a clear and transparent way.
<i>Criterion 9: Stakeholders representing environmental, social and economic interests consider trade-offs to be appropriate</i> Do stakeholders perceive and understand the trade-offs made with regard environment quality, social welfare and economic growth?	Stakeholders are unaware of trade-offs between issues of environmental quality, social welfare and economic growth.	Stakeholders are aware of trade-offs between environment quality, social welfare and economic growth but do not fully understand them.	Stakeholders are aware and understand trade-offs between environment quality, social welfare and economic growth.	Stakeholders are aware, understand and fully endorse trade-offs between environment quality, social welfare and economic growth.

References

- [1] GESAMP Joint Group of Experts on the Scientific Aspects of marine environmental protection. The contributions of science to Integrated Coastal Management. GESAMP Reports and Studies No. 61, 1996.
- [2] Commission of the European Communities. Towards a European integrated coastal zone management (ICZM) strategy: general principles and policy options – a reflection paper. Luxembourg: Office for Official Publications of the European Communities; 1999a.
- [3] Cicin-Sain B, Knecht RW. Integrated coastal zone management: concepts and practices. Washington D.C: Island Press; 1998.
- [4] Ehler CN. Indicators to measure governance performance in integrated coastal management. Ocean and Coastal Management 2003;46(3–4):335–45.
- [5] Commission of the European Communities. Lessons from the European commission's demonstration programme on integrated coastal zone management (ICZM). Luxembourg: Office for Official Publications of the European Communities; 1999b.
- [6] Morse S, McNamara N, Acholo M, Okwoli B. Sustainability indicators: the problem of integration. Sustainable Development 2001;9:1–15.
- [7] Commission of the European Communities. Recommendation of the European parliament and council concerning the implementation of integrated coastal zone management in Europe. Official Journal of the European Communities; 2002. Brussels: European Commission.
- [8] EU working group on indicators and data report of the working group on indicators and data to the EU ICZM expert group. Barcelona: European Topic Centre for the Terrestrial Environment; 2004.
- [9] Schema d'Amenagement Integre du Littoral. Integrated coastal zone management in the southern North Sea, <http://www.sailcoast.org/index.shtml>; 2004 [online]. Bruges: SAIL. Available from:.
- [10] Bell S, Morse S. Sustainability indicators: measuring the immeasurable. London: Earthscan; 1999.
- [11] Burbridge PR. A generic framework for measuring success in integrated coastal management. Ocean and Coastal Management 1997;37(2):175–89.
- [12] Henocque Y. Development of process indicators for coastal zone management assessment in France. Ocean and Coastal Management 2003;46:363–79.
- [13] Olsen SB. Frameworks and indicators for assessing progress in integrated coastal management initiatives. Ocean and Coastal Management 2003;46:347–61.
- [14] Pickaver AH, Gilbert C, Breton F. An indicator set to measure the progress in the implementation of integrated coastal zone management in Europe. Ocean and Coastal Management 2004;47:449–62.
- [15] Checkland P, Scholes J. Soft systems methodology in action. Chichester: John Wiley and Sons; 1990.
- [16] Clayton A, Radcliffe N. Sustainability: a systems approach. London: Earthscan; 1996.
- [17] Van der Weide J. A systems view of integrated coastal management. Ocean and Coastal Management 1993;21:129–48.
- [18] Dronkers J, de Vries I. Integrated coastal management: the challenge of transdisciplinarity. Journal of Coastal Conservation 1999;5(2):97–102.
- [19] Bell S, Coudert E. A practitioner's guide to imagine: the systemic and prospective sustainability analysis. Blue Plan Papers 3. Valbonne: Blue Plan; 2005.

- [20] Marin V, Ivaldi R, Palmisani F, Fabiano M. Application of participatory method for beach management. MEDCOAST 07. In: Ozhan E, editor. Proceedings of the eighth international conference on the Mediterranean coastal environment. Ankara, Turkey: Middle East Technical University; 2007. p. 283–94.
- [21] Gallagher A, Johnson DJ, Glegg G, Trier C. Constructs of sustainability in coastal management. *Marine Policy* 2004;28(3):249–55.
- [22] Gallagher AW. Sustainability systems appraisal for integrated coastal zone management. PhD thesis, Southampton Solent University and Nottingham-Trent University. 2006.
- [23] Clark JR. Coastal zone management for the new century. *Ocean and Coastal Management* 1998;37(2):191–216.
- [24] McGlashan DJ. Coastal management in the future. In: Sheppard C, editor. *Seas at the Millenium: an environmental evaluation*, vol. 3. Oxford: Pergamon; 2000.
- [25] Cicin-Sain B. Sustainable development and integrated coastal zone management. *Ocean and Coastal Management* 1993;21(1–3):11–43.
- [26] Firn Crichton Roberts Ltd and Graduate School of Environmental Studies, University of Strathclyde. An assessment of the socio-economic costs and benefits of integrated coastal zone management. Luxembourg: Office for Official Publications of the European Communities; 2000.
- [27] O'Riordan T. Connecting people to nature: Johannesburg and beyond. *ECOS* 2003;24(1):5–9.