Sustainable Development Criteria and the Ecosystem Approach

SSMEI Desk study

Scottish Executive

October 2005
Final draft
9P1698

A COMPANY OF

ROYAL HASKONING

HASKONING UK LTD.
ENVIRONMENT

10 Bernard Street
Leith
Edinburgh EH6 6PP
United Kingdom
+44 (0)131 555 0506 Telephone
Fax
info@edinburgh.royalhaskoning.com E-mail
www.royalhaskoning.com Internet

Document title	Sustainable Development Criteria and the Ecosystem Approach SSMEI Desk study
Document short title	SSMEI sustainable development criteria
Status	Final draft
Date	October 2005
Project name	SSMEI
Project number	9P1698
Client	Scottish Executive
Reference	9P1698/R/FN/Edin

Drafted by	Fiona Nimmo	
Checked by	Rod Cappell	
Date/initials check	……	……
Approved by	Alistair Davison	
Date/initials approval	……	……

SUMMARY

1. Objectives

This study has been undertaken as part of the Scottish Executive's 'Scottish Sustainable Marine Environment Initiative' (SSMEI) and focuses on research to guide and inform the SSMEI pilots. The SSMEI has an overarching objective of developing and evaluating approaches to sustainably manage Scotland's marine resources. This body of work will help the pilots to see sustainable development fully incorporated in their work.

The application of sustainable development criteria throughout the SSMEI will therefore:

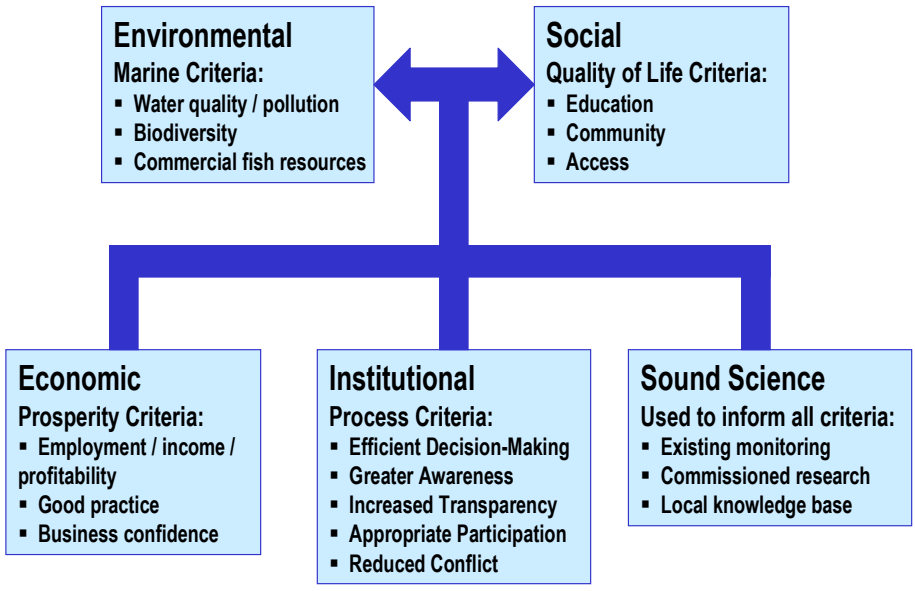
- Provide **guidance** for the management of marine activities and stakeholders, therefore ensuring consistent advice across the SSMEI pilots and consideration of national priorities;
- Provide consistent targets and indicators to be able to **monitor** the success of the SSMEI pilot approaches in improving sustainability in the marine environment.

2. A Sustainable Development Framework

Producing a definitive set of sustainable development criteria that can be agreed by all parties and interest groups is not feasible as each will have its own focus and priorities. Attention has therefore been on establishing a broad framework within which to develop criteria that are context-specific.

The UK's shared framework for sustainable development "**One Future – Different Paths**" sets the framework for sustainable development to 2020 and provides a consistent approach across the UK in achieving overall aims while taking account of differences in implementation. SSMEI will incorporate this SD framework as illustrated in figure 1.

Figure 1 Proposed SSMEI framework for sustainable development criteria.



A key element to achieving implementation of the ecosystem approach in practice is to focus on improving coherence and as such is already embedded within the framework of sustainable development.

3. Sustainable Development Criteria

Sustainable development criteria, appropriate to SSMEI's focus on the marine environment, are proposed for each aspect of the framework. Significant changes in the environment, society or the economy may not be fully observable over the 3 year timescale of the pilots or easily attributable to the existence and actions of the SSMEI project. Qualitative reporting and assessment as part of the SSMEI reporting and evaluation commitments is likely to be the most suitable for assessing SSMEI's contribution to these criteria.

The institutional process criteria are perhaps the most likely to illustrate impact of the SSMEI in terms of time scale, measuring efficiency and better integration. Attitudes, aspirations and practice often change before tangible results can be determined.

4. Sustainable Development Indicators (SDI's)

SDIs measure the extent to which any action is sustainable, and consequently, the effect of any change in that action. SDI's provide a simplified view of a more complex situation and can be both measurable (quantitative) or descriptive (qualitative).

Potential indicators relevant to SSMEI are proposed for each sustainable development criterion. These are adapted from indicators currently in use or recommended by Scottish Executive and UK initiatives. They are divided into 3 types of indicator:

- **Milestones –** those that are already planned outputs of the pilot projects and illustrate the linkage between the criteria proposed and the tasks of the SSMEI pilots (monitored through progress reporting)

- **Specific –** those that relate specifically to SSMEI impacts or actions (mostly monitored by annual survey and independent evaluation)

- **Contextual –** those that provide useful background, but impact of SSMEI is unlikely to be directly attributed (mostly monitored through secondary data from existing monitoring or in association with other initiatives).

5. Using SD criteria for Monitoring

An annual survey, as recommended in the SSMEI monitoring and evaluation strategy, should be used to inform a number of the indicators proposed – particularly the SSMEI-specific criteria. This annual stakeholder survey will be carried out for each pilot by an independent team (with assistance from the project officer) and will be designed to provide qualitative assessment by stakeholders of progress and achievements appropriate to each pilot.

This approach minimizes the monitoring burden for project officers. Monitoring will use progress reports for milestone criteria (for which time and resources are allocated), the use of the annual survey to assess indicators specific to SSMEI (expected to be mainly

qualitative in nature) and the use of readily available secondary data for contextual criteria (highlighting the circumstances within which SSMEI is operating).

6. Using SD Criteria for Guidance

A second desk study, "Decision-making mechanisms in the Scottish Marine Environment" has been produced, which explains where the SSMEI pilots, including the SD criteria outlined here, can contribute to the decision-making process.

SSMEI can inform and influence the process of management and development at different stages. How SSMEI actually contributes when the pilots are established will depend upon the involvement, acceptance and adoption of the principles and criteria established by stakeholders and regulators.

The SSMEI pilot groups may be able to influence developments through responses to consultations following consideration of the Sustainable Development criteria and raising awareness of sustainability issues within the pilot areas. There may be other opportunities to positively influence marine management including adoption of the marine spatial plan itself.

The criteria developed would not be put directly to the developers initially, but considered by the SSMEI group based on information provided. This will minimise additional burden on developers and highlight information gaps including elements that are persistently ignored.

7. Outcomes

As the involvement of SSMEI in the decision-making process becomes better known, developers and planners should recognise the benefit of applying the SD criteria themselves (i.e. considering the social economic and environmental impacts of their developments or activities). Such consideration will enable initial proposals to be more sustainable and be looked on more favourably by other stakeholders and regulators.

The development of a set of sustainable development criteria will enable the SSMEI project to consider individual pilot additions and amendments to ensure they remain in line with the overarching and national SSMEI objectives of sustainable development and the application of the ecosystem approach in the management of Scotland's marine environment.

CONTENTS

1 INTRODUCTION

1.1 SSMEI context

This study has been undertaken as part of the Scottish Executive's 'Scottish Sustainable Marine Environment Initiative' (SSMEI) and focuses on research to guide and inform the SSMEI pilots. The SSMEI has an overarching objective of developing and evaluating approaches to sustainably manage Scotland's marine resources. This body of work will help the SSMEI pilots to ensure sustainable development is fully incorporated into their work in implementing the pilots. The work will also contribute to evaluation of the pilots through setting a baseline and monitoring progress using the proposed sustainable development criteria and as an input to assessing the impact of the SSMEI pilots.

The application of sustainable development criteria throughout the SSMEI will therefore:

- Provide **guidance** for the management of marine activities and stakeholders, therefore ensuring consistent advice across the SSMEI pilots and consideration of national priorities;

- Provide consistent targets and indicators to be able to **monitor** the success of the SSMEI pilot approaches in improving sustainability in the marine environment.

Adequate monitoring is essential for projects such as SSMEI, where innovative approaches are being tested. Quantitative criteria and indicators should form part of the set of indicators but for a project attempting to address so many areas of the marine environment, particularly for those pilots that are focused on the integration of environmental management practices, many criteria and their indicators may be qualitative in nature.

The purpose of this report is to:

- Ensure a consistent approach in establishing sustainable development criteria based on current best practise and guidance and national priorities;

- Propose a menu of potentially appropriate sustainable development criteria and indicators that can be adopted by the pilot areas to guide progress and measure success;

- Ensure the sustainable development criteria are able to illustrate and report on the application of the ecosystem approach to the management of the pilot areas.

It is recognised that it may be difficult to illustrate a distinct contribution by the pilot projects to progress on many of the sustainable development indicators (SDI's) established, particularly in the relatively short timescale of 3 years given that some of the outcomes may only be fully discernible over a longer period.

It is anticipated that most direct pilot impacts may relate to process criteria that consider changes to management structures and decision-making mechanisms. For this reason, and

to promote a consistent approach, a separate desk study has been undertaken focusing on decision-making mechanisms in relation to the marine environment to inform the pilots. This report, along with further information on the SSMEI project can be found on the project website (www.scottish-marine-sustainability.co.uk).

1.2 Background

The established principle "*if you can't measure it, you can't manage it*"[1] has been used to justify the introduction of sustainable development measurements in business, government and voluntary sector activities throughout the world[2]. Sustainable development is now a widely accepted objective. There is a huge literature on sustainable development, a wide variety of sustainability applications and a host of useful tools and methodologies.

UK initiatives on sustainable development on land and sea have grown out of commitments made at the 1992 Rio Earth Summit. The Scottish Executive, along with other administrations in the UK, has agreed a shared framework for sustainable development[3] and is developing a new Scottish Sustainable Development Strategy, due to be launched in autumn 2005, part of which will review the current set of Sustainable Development Indicators for Scotland.

The Scottish Executive is committed to exploring the application and implementation of the ecosystem approach. Key to achieving a successful ecosystem approach is the development of appropriate management systems, which can be delivered through a number of methods where necessary, including decision-making procedures, spatial planning, monitoring and stakeholder involvement.

The adoption of sustainable development-based criteria provides a mechanism to focus on the principles of sustainable development, promoting positive contributions to sustainable development objectives and delivering the ecosystem approach to the management of the pilots.

Sustainable Development Indicators (SDI's) measure each criterion and are a method to quantify or qualify a situation in relation to the criterion, while also improving communication by applying specific working examples. Quantitative SDI's that simply measure indicators and targets are preferable, however given the relative short (initial) time period (3 years), the lack of baseline data available and the relatively uncertain nature the factors being considered, it is likely that qualitative SDI's will be most applicable in measuring change throughout the SSMEI pilots.

Many sets of indicators exist from previous and current initiatives at a national level and in some of the pilot areas, but these are not specifically geared for marine environment

[1] Roberts,1995

2 Jackson & Roberts, 2000

[3] HM Government, Scottish Executive, Welsh Assembly Government and Northern Ireland Office, 2005 One future – different paths: The UK's shared framework for Sustainable Development.

components (although some are applicable). It is therefore necessary to establish sustainable development criteria and indicators that will be directly relevant to the SSMEI, while being consistent with wider Scottish Executive and UK initiatives.

1.3 The Ecosystem approach

The UK has committed to adopt an ecosystem-based approach to the management of anthropogenic activities in the marine environment. Background on the ecosystem approach is presented in section 2. Many Scottish Executive polices are currently adopting the ecosystem approach e.g. fisheries. The SSMEI also aims to applying the ecosystem approach.

The concepts of sustainable development and the ecosystem approach are highly complementary. In ensuring sustainable development is adequately considered, the key tenets of the ecosystem approach will be addressed. Any management systems put in place to ensure sustainable development of the marine environment should support the objectives of an ecosystem approach[4]. The production of sustainable development criteria and sustainable development indicators within this report will therefore, as part of their application within the SSMEI, assess the delivery of the ecosystem approach and promote its application.

1.4 Approach to the work

This report presents the outcomes of an initial workshop held on sustainable development criteria and the ecosystem approach and background research undertaken as part of this study, along with consultation with partners at a pilot level to discuss locally appropriate indicators.

The approach to this work can be summarised as follows:

- Use Scottish Sustainable Development Criteria Headline Indicators as basis;
- Add detail on marine environment in areas of management, fisheries, biodiversity and water quality;
- Agree long-list of indicators for criteria (some generic to SSMEI and some specific to each pilot) to undertake monitoring during and after pilot;
- Propose sources of data for each indicator;
- Assess confidence in data sources;
- Agree short-list of indicators following assessment by Steering Group.
- Pilots propose final list of indicators for monitoring pilot progress and impact.

[4] Rogers & Greenaway, 2005

2 LITERATURE REVIEW

2.1 Sustainable Development Frameworks

There are many ongoing initiatives to establish and agree broad sets of sustainable development criteria and overall frameworks for the assessment of sustainable development. Organisation for Economic Co-operation and Development (OECD), the European Commission (EC), the European Environment Agency, the World Bank, the UN Food and Agriculture Organisation, the stock markets, and various academics and research centres are all working on sets of criteria. But, there is no internationally agreed framework for the assessment of sustainable development. The EC, OECD, UN Agencies and the World Bank have all developed slightly different frameworks and indicator sets.

Different interest groups interpret and prioritise various aspects of sustainable development differently and thus developing a comprehensive set of criteria becomes both extremely complex and unwieldy. The task of producing definitive sustainable development criteria that can be agreed by all parties and interest groups to cover all circumstances is therefore not feasible. In reality, meaningful sustainable development assessment usually needs to be context specific[5]. Attention should therefore be drawn away from producing specific universal sustainable development indicators and in stead be focused on establishing broad frameworks for assessment[5]. These frameworks can then help guide the selection of sustainable development criteria and indicators for specific technologies, situations and areas.

Some assessment frameworks specifically avoid the use of the higher level categories – they go straight into a suite of headline sustainable development criteria (e.g. the current Scottish Executive sustainable development indicator set). Dividing impacts into broad categories can make it easier to understand the relevance and importance of the criteria - the sustainable development impact can then be thought of in terms of environmental impact, social impact, and economic impact[6].

One approach advocated by much of the literature on assessing sustainable development is the triple bottom line approach. This related to the three pillars of sustainable development – environment, social and economic. These are seen as higher level, key or core categories, from which sustainable development criteria and indicators can be established.

Although there is no internationally agreed framework for the assessment of sustainable development, all four countries in the UK now have an agreed framework, which builds on the approaches taken in different parts of the UK. In March 2005, the UK's shared framework for sustainable development "One Future – Different Paths" was launched in conjunction with the associated UK Government Strategy. This sets the framework for sustainable development to 2020 and will provide a consistent approach and focus across the UK in achieving overall aims while taking account of differences in implementation.

[5] Hambrey, 2003
[6] Hambrey *et al.*, 2004

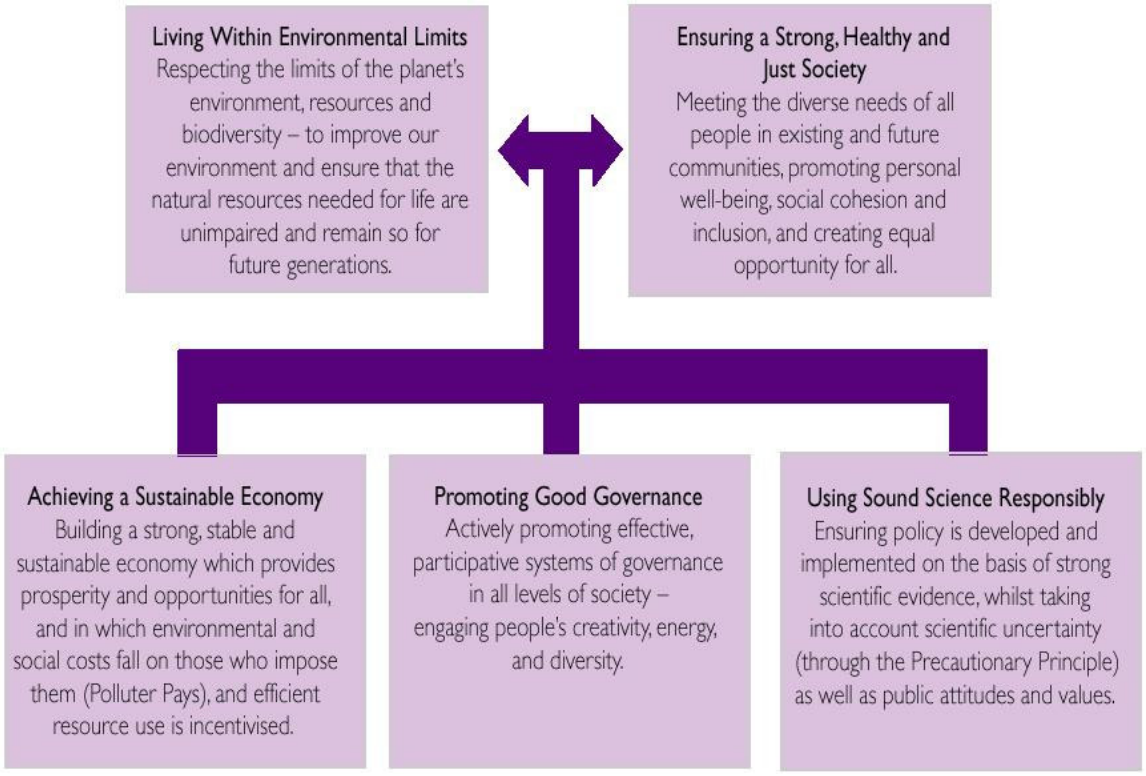


Figure 2.1. Overarching approach in "One future – different paths"[7].

The UK Government, Scottish Executive, Welsh Assembly Government and the Northern Ireland Administration will follow this set of shared UK principles (Fig 2.1) which will form a basis for sustainable development policy in the UK. For a policy to be sustainable, it must respect all five principles in order to achieve the goals of living within environmental limits and a just society, by means of sustainable economy, good governance, and sound science.

2.2 Pressure-State-Response (PSR)

Many sets of indicators follow the Pressure-State-Response (PSR) technical model derived by the OECD in 1994. The PSR model lays out the basic relationships between the pressures human society puts on the environment, the resulting state or condition of the environment, and the response of society to these conditions to reduce or prevent negative impacts resulting from the pressures. The PSR model is based on the concept of causality and is often chosen as a starting point because of its simplicity, wide acceptance, and the fact that it can be applied to any scale[8].

Another model that builds on PSR is the Driving Force - Pressure - State – Impact - Response (DPSIR) model. In this model driving forces are the human influences and activities that, when combined with environmental conditions, underpin environmental

[7] HM Government, Scottish Executive, Welsh Assembly Government and Northern Ireland Office, 2005
[8] Cordah, 2001

change and impacts are the results of pressures on the current state of the environment, which again are expected to occur sequentially. Without clear appreciation of the differences in interpretation, these can confuse groups trying to use such a framework. It is however a useful exercise to agree where particular indicators may fit within this process framework ie. is the indicator describing a response such as legislation or management measures or is it describing the state of the environment resulting from a particular pressure.

2.3 Indicators

A large amount of global effort has been invested in developing indicators. The International Institute for Sustainable Development keeps a database of over 600 indicator programmes currently in operation[9]. The UK now contributes to the development and application of indicators of sustainable development at all scales from global and European to national, regional and local[10].

A recommendation of the initial SSMEI workshop held for this project is that each sustainable development criterion should have at least one indicator allocated, to evaluate change and observe trends over time.

Sustainable Development Indicators (SDI's) measure the extent to which any action is sustainable, and consequently, the effect of any change in that action. SDI's are currently receiving a considerable amount of attention[11] and are essentially an attempt to answer the question;

"How might I know objectively whether things are getting better or getting worse?"[12]

SDI's provide a simplified view of a more complex situation and can be both measurable (quantitative) or descriptive (qualitative).

There is a clear need for the application of SDI's: not only does their development fulfil national and international obligations, but indicators can monitor the progress towards sustainable development. Thus, SDI's can reveal the extent to which sustainable development objectives and targets are being met and, furthermore, measure aspects of the delivery of the ecosystem approach.

The selection of appropriate indicators is dependent on a number of factors. Indicator types differ depending on the scale of area under consideration and the target audience. Local indicators tend to address issues in more detail and are often aimed at empowering local communities to help resolve specific local issues. National indicator sets are broader, less detailed, and generally aimed at reporting progress towards achieving national targets driven by national policies[13]. In the context of SSMEI, which has a broad range of interests, it is perhaps most important to develop indicators that are simple, clear and unambiguous while keeping sight of local circumstances and national priorities.

[9] www.iisd.org
[10] Scottish Biodiversity Forum, 2003
[11] Cordah, 2001
[12] Gallagher, 1999
[13] Cordah, 2001

An indicator should aim to have some of the following characteristics:

- Understandable, i.e., clear, simple and unambiguous.
- Relevant to assessing progress towards sustainable development.
- Interesting and relevant to public and private sector decision makers, using existing data where possible or adding value where not.
- Limited in number, remaining open ended and adaptable to future developments.
- Capable of showing trends over time.
- Sensitive to the changes they are meant to reflect.
- Based on readily available data.
- Capable of being updated at regular intervals

It is important to remember that developing indicators is an ongoing process - it is not realistic to find the perfect indicator, or set of indicators, immediately. New indicators will be developed over time as research and monitoring provide a better understanding of environmental issues and the relationships between ecosystems and human uses and values.

There are a number of limitations commonly associated with applying SDI's, such as:

- Lack of baseline or context data;
- Short timescales for the indicators to be measured across;
- Level of monitoring required for certain indicators;
- Disentangling change from variation;
- Cost of collecting data; and
- Artificial accuracy[14].

For SSMEI some of these limitations can be addressed by research to be commissioned through the pilots and the regular evaluation and monitoring effort proposed. The above considerations, including cost implications for ongoing monitoring after the pilots, should be borne in mind when selecting indicators.

The Scottish Coastal Forum in its State of the Coast report proposes that a list of Scottish ICZM process indicators should be developed that link with other national and international series. This aspiration is borne in mind when developing SSMEI indicators with existing lists reviewed and wherever possible existing monitoring efforts proposed as information sources. Indicators must, however, be fit for purpose and so, while consistency is highly desirable, a number of factors result in indicators often being specific to their particular monitoring role.

[14] Artificial accuracy refers to problems found in assessment at certain scales. In some instances assessment at a smaller scale is more accurate, but for some indicators this will not be the case. For example, considering fish stocks or other mobile and wide ranging species in a geographically limited pilot area may not easily equate to overall stock or population status.

2.4 The Ecosystem Approach

The Earth Summit in Rio de Janeiro, 1992, recognised that the traditional sectoral approach to natural resource and environmental management was inadequately addressing human impacts on the environment. A more holistic approach was deemed necessary and as such the 'Ecosystem Approach' started to appear in initiatives and agreements.

The ecosystem approach was defined in the Convention on Biological Diversity, 2000, as:

> *"…a strategy for the integrated management of land, water and living resources that promotes conservation and sustainable use in an equitable way. The application of the Ecosystem Approach will help to reach a balance of the three objectives of the Convention: conservation; sustainable use; and the fair and equitable sharing of the benefits arising out of the utilization of genetic resources."*

The Ecosystem Approach was adopted by the Convention on Biological Diversity in May 2000 as the fundamental tool for delivery of the Convention's primary objectives. It was endorsed by the World Summit on Sustainable development (WSSD) in Johannesburg (2002) and features strongly in the subsequent Plan of Implementation. The Conference of Parties of the CBD recommended 12 principles to guide signatory countries in the practical application of the Ecosystem Approach (Annex 1).

Several other working definitions exist. For example, it was further defined by at the EU Marine Strategy Stakeholder Workshop, Denmark, 4 – 6 December 2002, as:

> *"…the comprehensive integrated management of human activities, based on best available scientific knowledge about the ecosystem and its dynamics, in order to identify and take action on influences which are critical to the health of the marine ecosystems, thereby achieving sustainable use of ecosystem goods and services and maintenance of ecosystem integrity."*

Commitments have been made to achieve international ecosystem targets which have driven developments in the ecosystem approach in the UK such as halting biodiversity decline by 2010[15] and encouraging the application of the ecosystem approach for the sustainable development of the oceans[16]. The new European Water Framework Directive is highly compatible with the application of the Ecosystem Approach. The Ecosystem Approach has also been recommended as a strategic approach to implementing the requirements of the OSPAR and Ramsar Conventions, as well as numerous other international agreements on the marine and coastal environment[17].

[15] OSPAR, 2003
[16] UNEP, 2004
[17] Laffoley *et al.*, 2004

2.5 Implementing the ecosystem approach

The Ecosystem Approach is often seen as an intangible concept and implementing the Ecosystem Approach as a huge challenge. To consider the ecosystem approach in a literal way runs into immediate problems in implementation. The present level of understanding of marine ecosystems is insufficient to derive robust and meaningful measures for an entire ecosystem. It is therefore only realistic to develop indicators that consider the extent of impact of an activity on known parts of an ecosystem rather than across an entire ecosystem. Even with more extensive knowledge, setting appropriate boundaries for ecosystems is problematic for open marine systems.

The Ecosystem Approach is in fact already embedded within the framework of sustainable development. It is recognized that a key element to achieving implementation of the ecosystem approach in practice is to focus on improving coherence. Seven areas of coherence with priorities for action have been set out in the English Nature report "The Ecosystem Approach. Coherent actions for marine and coastal environments. A report to the UK Government" (see Annex 1). The seven areas are:

- Environmental coherence
- Economic coherence
- Social coherence
- Spatial coherence
- Temporal coherence
- Scientific coherence
- Institutional coherence

These areas of coherence are thought to provide a useful means of conceptualising the broad scope of the Ecosystem Approach and a focus for prioritising the actions required for its delivery. As the earlier section illustrates, most areas of coherence mentioned above are explicitly considered in the UK Sustainable Development Framework. The ecosystem approach also introduces the concept of spatial and temporal coherence.

Temporal coherence is a central consideration in sustainable development. The widely-quoted Brundtland[18] definition focuses on intergenerational coherence as it states, "Meeting the needs of the present generation without compromising the needs of future generations".

The explicit consideration of spatial coherence is perhaps the area most commonly associated with the ecosystem approach as we must consider the impact on ecosystem connections that may be outwith the immediate spatial area of concern. It also refers to the need for consistency in approach between local, regional, national and, ideally, international management as ecosystems to not keep to borders.

Monitoring the principles of the ecosystem approach should not impose additional requirements for the SSMEI pilots if they are considered and addressed throughout the SSMEI sustainable development framework and sustainable development criteria. The

[18] World Commission on Environment and Development (Brundtland Commission), 1987

development and implementation of marine spatial planning in several of the pilots will address the spatial and temporal coherence advocated. The ecosystem approach will therefore be fully applied to the SSMEI project.

Sustainable development indicators offer a comparatively simple method to get a snap shot of progress towards delivery of the Ecosystem Approach.

3 AN SSMEI FRAMEWORK FOR SUSTAINABLE DEVELOPMENT CRITERIA

This report sets out to establish sustainable development criteria to provide guidance for the management of marine activities, businesses and stakeholders, and also to monitor the success of the SSMEI projects in improving sustainability in the marine environment and delivering the Ecosystem Approach. This poses the question – should the same set of criteria / indicators be used for both purposes?

Although both guidance and monitoring will have the same fundamental basis and use the same framework it may be too constraining to impose exactly the same suite of criteria for both purposes. It is therefore proposed that criteria be organised into an appropriate framework with a comprehensive set of indicators that will provide guidance to the pilots on sustainable development and the ecosystem approach, but that pilot monitoring should be undertaken at an appropriate level. So the same framework will be used to serve both ends, but the level of detail and focus of the criteria are likely to be different.

The proposed SSMEI framework for sustainable development criteria (Fig 3.1) has been developed in line with the framework set out in "One future – different paths: The UK's shared framework for Sustainable Development", 2005 (Fig 2.1). It is an objective of the SSMEI to develop management approaches consistent with Scottish Executive priorities and the UK's international commitments and obligations. It is therefore fitting that the SSMEI framework for sustainable development criteria is consistent with that developed at a national level.

The SSMEI framework also builds on the triple bottom line approach, with the social, environmental and economic headline criteria forming an integral part of the framework. Specific objectives of the SSMEI are to ensure an economically and socially sustainable future for Scotland's coastal communities and marine industries and to deliver biodiversity benefits whilst supporting the sustainable use of natural resources. The success of these objectives can be monitored through the economic, social and environmental criteria set out in the proposed SSMEI framework (Fig 3.1). Furthermore, the institutional criteria will assess the SSMEI's success in providing effective mechanisms to increase awareness and improve relationships between resource users and other stakeholders and improve decision-making.

It is important to utilise existing knowledge and data sources and learn from other relevant initiatives to ensure that SSMEI is well informed and that studies are not duplicated. This is also important to avoid the project officers' time being spent collecting data for monitoring purposes rather than achieving the milestones of the pilots. More data is becoming available as recent and current initiatives start to introduce monitoring aspects e.g. Natura 2000 and the Scottish Biodiversity Strategy. The SSMEI framework also recognizes sound science as an essential tool to inform and support the economic, social, environmental and institutional aspects.

No other initiative or study has challenged itself to bring environmental, social, economical and institutional dimensions together and be measured through SDI's. Whether the SSMEI

pilots have the ability to deliver on all the criteria within the SSMEI framework will only be determined during the implementation and final phases the project.

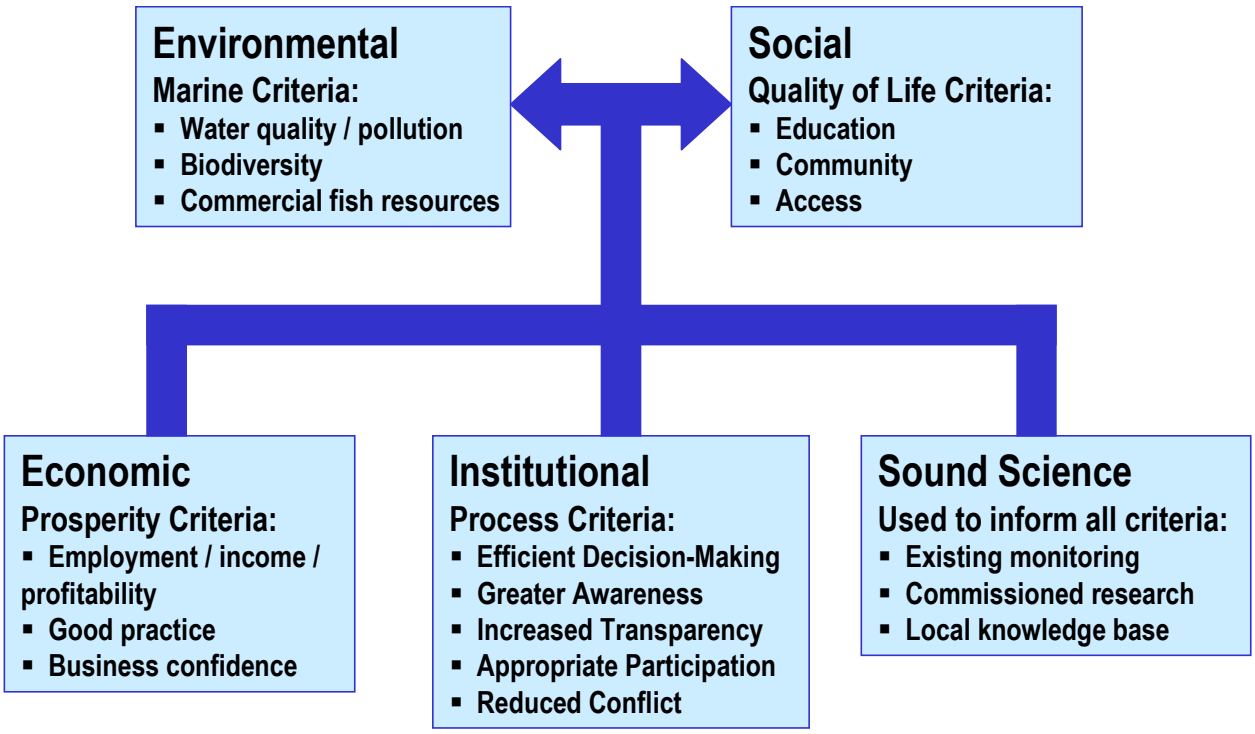


Figure 3.1 Proposed SSMEI framework for sustainable development criteria.

4 SSMEI SUSTAINABLE DEVELOPMENT CRITERIA AND INDICATORS FOR MONITORING

4.1 Criteria

Sustainable development criteria, appropriate to SSMEI's focus on the marine environment, are proposed for each aspect of the framework. These criteria will be assessed throughout the pilots' development.

Significant changes in the environment, society or the economy may not be fully observable over the 3 year timescale of the pilots or easily attributable to the existence and actions of the SSMEI project. Qualitative reporting and assessment as part of the SSMEI reporting and evaluation commitments is likely to be more suitable to assess SSMEI's contribution to these criteria.

The institutional process criteria are perhaps the most likely to illustrate impact of the SSMEI in terms of time scale, measuring efficiency and better integration. Attitudes, aspirations and practice often change before tangible results can be determined.

Environmental criteria should consider longer-term objectives and link with national and local initiatives wherever possible. The involvement of scientific partners such as FRS, North Atlantic Fisheries College and Millport will facilitate this link up and enable complementary research to be established. The social criteria such as community, education and awareness raising should also link with and not duplicate existing education, community and tourism initiatives. Economic criteria should determine the level of knowledge and consideration of sustainable development amongst the business community. These criteria would focus on those economic sectors impacting on the marine environment, assessing business confidence in marine-dependent sectors and help to determine progress towards sustainable development.

4.2 Indicators

Potential indicators relevant to SSMEI are proposed for each sustainable development criterion in Table 4.1. These have been adapted from indicators currently in use or recommended by Scottish Executive and UK initiatives (Annex 2). They are divided into 3 types of indicator:

- **Milestones –** these are already planned outputs of the pilot projects and illustrate the linkage between the criteria proposed and the tasks of the SSMEI pilots (monitored through progress reporting)

- **Specific –** those indicators that relate specifically to SSMEI impacts or actions (mostly monitored by annual survey and independent evaluation)

- **Contextual –** indicators that provide useful background, but impact of SSMEI is unlikely to be directly attributed (mostly monitored through secondary data from existing monitoring or in association with other initiatives).

It is suggested that a survey, as recommended in the SSMEI monitoring and evaluation strategy, should be used to inform a number of the indicators proposed – particularly the SSMEI-specific criteria. This stakeholder survey will be carried out annually for each pilot by an independent team (with assistance from the project officer) and will be designed to provide qualitative assessment by stakeholders of progress and achievements appropriate to each pilot.

Table 4.1 presents a suite of potential indicators: some associated with milestones, others specific to all pilots SSMEI or just individual pilots and a list of possible contextual indicators to enable assessment of SSMEI progress and activities in relation to background developments.

The criteria and associated indicators presented in Table 4.1 will monitor the SSMEI pilots throughout their three year life-span. The milestones are spread across the duration of the pilots and the annual survey will commence in year one. This allows the criteria and indictors to contribute to monitoring before and during implementation of the marine spatial plans, which are to be developed in three of the four pilots. The criteria and indicators will also contribute to long term monitoring in the pilot areas.

4.3 Proposed approach

The approach proposed minimizes the monitoring burden for project officers. Monitoring will use progress reports for milestone criteria (for which time and resources are allocated), the use of the annual survey to assess indicators specific to SSMEI (expected to be mainly qualitative in nature) and the use of readily available secondary data for contextual criteria (highlighting the circumstances within which SSMEI is operating).

The project officers have a challenging set of objectives and milestones associated with each pilot. The primary assessment for each pilot will relate to their specific SSMEI objectives; these are linked with the sustainable development criteria wherever possible by integrating the project milestones within the list of indicators.

The final step in this process will be for the SSMEI pilot management groups and Project Officers, with guidance from the national SSMEI steering group, to suggest which indicators are applicable and achievable for their respective pilots, given the data available. The indicators therefore need to achieve continuity and consistency, but should also remain flexible to individual pilot needs. The SSMEI steering group can then review these choices and assess their applicability prior to approval of the overall suite.

The work plans devised for the officers includes time for preparation of reports to pilot steering group meetings and reporting on progress to the overarching SSMEI steering group. Additional time spent by the project officers on monitoring progress should be kept to a minimum. This will be achieved using the approach outlined below.

1. Collective agreement on indicators

The table of criteria and indicators for monitoring purposes will be finalized in collaboration with the pilot steering groups and the project officers themselves. This will allow all parties to contribute to the final choice of indicator. Those involved at a pilot level are likely to be more aware of data availability specific to the area in question. They can therefore avoid indicators that would incur excessive effort to collate data and instead propose indicators where data is more readily available or appropriate.

2. Use of regular reporting

The reporting to pilot and overarching steering groups on progress will provide a regular record of achievements. As project officers will know what indicators are being monitored, progress against these can be recorded from the offset. This reduces the need for separate collection exercises. The integration of project milestones into the monitoring framework further illustrates the cross over between regular reporting and monitoring requirements.

3. Annual evaluation

As the table below illustrates, a substantial amount of information is to be derived from the annual survey. This is to be conducted by independent consultants and should not therefore require time input from the project officer other than in a facilitation role to disseminate questionnaires etc. Evaluation will also be a requirement for LEADER+ funding and the annual evaluation should provide information that can contribute towards LEADER+ information demands.

4. Use of secondary data

A major source of information – particularly for contextual purposes – will be from data providers that are already undertaking monitoring activities. The Scottish Coastal Forum's State of the Coast report lists ongoing monitoring effort around the Scottish coast and suggests they represent 'outcome' indicators for ICM. Many of these data sources can be used to monitor the SSMEI contextual indicators proposed. Agreements are to be established with data providers to ensure all relevant information is available to the project. Again this should minimize the impact on the project officers' time.

5. Adaptability

While consistency in approach is important for monitoring, should the agreed monitoring arrangements be found too onerous, the project should be flexible enough to allow changes to the indicators. Early feedback from project staff in this regard will allow alternative arrangements to be made that ensure adequate monitoring of progress.

Table 4.1 Menu of indicators relevant to SSMEI pilot with possible information sources

Note: M = milestone (already a planned output of the pilot projects), **S = specific** (fully or partly attributable to SSMEI actions), **C = contextual** (not attributable to SSMEI actions, but relevant to criteria). Where more than one contextual indicator is proposed, pilots should choose those that are most relevant and accessible from secondary data sources.

Criteria		Potential SSMEI Indicators	Information sources			
			Shetland	Clyde	S' Mull	B'shire
Institutional Process Criteria						
Decision-Making *which is both integrated and informed*	M	• Review existing arrangements (Clyde) • Adopt and trial new decision-making measures (Clyde) • Document on informal management practices (Mull)		yes	yes	
	S	• Decision-making mechanisms desk study (baseline) • Monitor changes to decision making process • Number of regulators signed up to and implementing Marine Spatial Plan	Annual reporting	Annual reporting	Annual reporting	Annual reporting
	C	• Comparison of current situation with baseline	SSMEI annual survey	SSMEI annual survey	SSMEI annual survey	SSMEI annual survey
Conflict level *between and within stakeholders and regulators*	M	• Production of a review of marine resource use (Berwickshire) • Report on sectoral interactions (Clyde, Mull)		yes	yes	yes
	S	• Evidence of conflict avoidance/resolution	annual survey	annual survey	annual survey	annual survey
	C	• Reduced number of complaints/objections/proceedings • % of successful applications	SEPA / LA / annual survey	SEPA / LA / annual survey	SEPA / LA / annual survey	SEPA / LA / annual survey
Appropriate Participation *of the stakeholders and local community in the decision-making process*	M	• Workshops held for key stakeholders on SSMEI • Establishment of SSMEI partnership core group (Mull)	Annual reporting	Annual reporting	Annual reporting	Annual reporting
	S	• Number of and participation in SSMEI events	PO progress reports	PO progress reports	PO progress reports	PO progress reports

	C	• Volunteer rate within local community e.g. % of people who volunteer • Number of and participation in initiatives eg. community beach cleans	Local authority	Local authority	Local authority	Local authority
Awareness *of sustainability and sustainable development in local communities and amongst users*	M	• Production of a road show visiting local schools and community groups (Berwickshire) • Establish web-site and web-based library (Clyde, Mull) • Production and dissemination of regular project updates (all)	yes	yes	yes	yes
	S	• Number of public events held promoting the project and its objectives • Feedback on SSMEI information and events	Annual reporting/ survey	Annual reporting/ survey	Annual reporting/ survey	Annual reporting/ survey
	C	• Media coverage	SSMEI annual survey/ PO	SSMEI annual survey/ PO	SSMEI annual survey/ PO	SSMEI annual survey/ PO
Criteria		**Potential SSMEI Indicators**	**Information sources**			
			Shetland	**Clyde**	**S' Mull**	**B'shire**
Marine Environmental Criteria						
Water quality / pollution *of the pilot's marine and coastal areas*	M	• Test methodologies for conducting an environmental capacity study (Mull) • Study in environmental capacity and environmental capacity (Shetland)	yes		yes	
	S	• New initiatives or actions developed	Annual reporting	Annual reporting	Annual reporting	Annual reporting
	C	• Degree of compliance with Bathing Water Directive microbiological standards • Concentration of nutrients in coastal waters • Waste water treatment capacity and index of reuse of treated water	SEPA WFD monitoring / FRS / Scottish water	SEPA WFD monitoring / FRS / Scottish water	SEPA WFD monitoring / FRS / Scottish water	SEPA WFD monitoring / FRS / Scottish water

Biodiversity *of marine and coastal species and habitats*	M	• Location and value of natural heritage (Shetland) • 'Assessing value of the marine environment' report (Berwickshire)	yes			yes
	S	•				
	C	• % of BAP species or habitats stable or increasing • Trends in LBAP or UK BAP priority species and habitats • Abundance of seabirds • Extent and Effective management of designated sites	UKBAP network / RSPB / SNH/LAs/SEERAD	UKBAP network / RSPB / SNH/LAs/SEERAD	UKBAP network / RSPB / SNH/LAs/SEERAD	UKBAP network / RSPB / SNH/LAs/SEERAD
Fisheries *operating within the boundaries of each SSMEI pilot*	M	• Location and value of fisheries resources (Shetland) • 'Assessing value of the marine environment' report (Berwickshire) • Liaison with sectoral initiatives (ie. Seafish Clyde fisheries development project) • Establish constructive relations with local fishing sector (Mull)	yes	yes	yes	yes
	S	• Sustainable fisheries initiative (Berwickshire)				Monitoring success of initiative
	C	• Volume and value of fish landings • Proportion of fish stocks within safe biological limits • State of main fish stocks by species and sea area • Recruitment and spawning stock biomass by species • Fish mortality by species • Sustainable methods in fisheries and aquaculture	SEERAD/IFMG/ local kn'ledge SEPA/ fisheries boards	SEERAD/IFMG/ local kn'ledge SEPA/ fisheries boards	SEERAD/IFMG/ local kn'ledge SEPA/ fisheries boards	SEERAD/IFMG/ local kn'ledge SEPA/ fisheries boards

Criteria		Potential SSMEI Indicators	Information sources			
			Shetland	Clyde	S' Mull	B'shire
Social Quality of Life Criteria						
Education *of stakeholders and local community on marine and sustainability related issues*	M	• Educational material produced and links with local schools (Berwickshire) • Establish website and web-based library (Clyde, Mull) • Dissemination of promotional material and results (all)	yes	yes	yes	yes
	S	• Number of SSMEI related education events, programmes, workshops etc.	PO progress reports	PO progress reports	PO progress reports	PO progress reports
	C	• Educational material produced and disseminated • Availability of training in marine-related industries	SSMEI PO & annual survey	SSMEI PO & annual survey	SSMEI PO & annual survey	SSMEI PO & annual survey
Community *fulfillment*	M	• Community consultation (all)	yes	yes	yes	yes
	S	• Feedback from SSMEI community consultation	SSMEI PO & annual survey	SSMEI PO & annual survey	SSMEI PO & annual survey	SSMEI PO & annual survey
	C	• Proportion of people of working age who are in work • Community involvement • Level of dependence on marine activities	LAs & annual survey	LAs & annual survey	LAs & annual survey	LAs & annual survey
Access *to and from the marine and coastal resources*	M	• Harbour management and tourism initiatives (Berwickshire)				yes
	S	• Improvements to access resulting from initiatives (Berwickshire)				SSMEI PO & annual survey
	C	• Access infrastructure in place and maintained • Number of coastal and estuarine berths and moorings • Access for all to marine facilities and activities • Participation in sport and cultural activities • Availability of marine recreational instruction	Crown Estate / Harbour Master / L.A.	Crown Estate / Harbour Master / L.A.	Crown Estate / Harbour Master / THA/ L.A.	Crown Estate / Harbour Master / L.A.

Criteria		Potential SSMEI Indicators	Information sources			
			Shetland	Clyde	S' Mull	B'shire
Economic Prosperity Criteria						
Employment / income *direct and indirect within marine related businesses*	M	• Social and economic analysis (Shetland, Clyde & Mull) • Production of a review of marine resource use (Berwickshire)	yes	yes	yes	yes
	S	• Number of people employed as a result of SSMEI	PO reporting	PO reporting	PO reporting	PO reporting
	C	• Value added per sector Trends in marine sectoral employment • FT, PT and seasonal employment per sector • Age structure and gender structure • Freight intensity: sea freight tonnes / GDP • Volume of port traffic	LAs / survey / SE / Scot E'prise / Port Authority / Ferry operators/ DoT	LAs / survey / SE / Scot E'prise / Port Authority / Ferry operators/ DoT	LAs / survey / SE / Scot E'prise / Port Authority / Ferry operators/ DoT	LAs / survey / SE / Scot E'prise / Port Authority / Ferry operators/ DoT
Business practice *within marine related businesses*	M	• Existing codes of conduct and management practices (Mull) • "Assessing the value of the marine environment and potential for added value through management" report (Berwickshire) • Sites and potential for renewable energy (Shetland) • Liaison with sectoral planning initiatives (Clyde)	yes	yes	yes	yes
	S	• Changes to business practice as a result of SSMEI • Number of private sector operators involved in or aware of Marine Spatial Plan	survey	survey	survey	survey

	C	• Proportion of tourist accommodation holding EU Eco-label • Percent of organisations that have adopted sustainable development goals or codes of conduct • Proportion of marine-dependent businesses achieving recognised environmental standards • Level of marine-dependent business participation in environmental initiatives • 'Green' energy practice (renewables, efficiencies)	survey / BMIF/STB/ LAs / SEERAD	survey / BMIF/STB/ LAs / SEERAD	survey / BMIF/STB/ LAs / SEERAD	survey / BMIF/STB/ LAs / SEERAD
Business confidence *within marine related businesses*	M	•				
	S	• Influence of SSMEI on marine-related business confidence in pilot area	Survey c/w national data	Survey c/w national data	Survey c/w national data	Survey c/w national data
	C	• Confidence in marine resource dependent industries • New business start-ups net of closures	LECs/ Las/ survey	LECs/ Las/ survey	LECs/ Las/ survey	LECs/ Las/ survey

5 SSMEI SUSTAINABLE DEVELOPMENT CRITERIA FOR GUIDANCE

5.1 Developing the guidance

The SSMEI pilot management groups will bring together considerable local marine expertise. In addition to undertaking the various tasks outlined for the pilot projects, it is also expected that the pilots will contribute to the decision-making process on developments and activities related to the marine environment in the pilot area. The contribution of SSMEI to the process can provide a positive influence in a number of formal and informal ways, ensuring sustainability is being considered. This is explored in a second desk-study on decision-making mechanisms, further discussed in section 5.2 below.

Guidance criteria are proposed to ensure that consistent advice can be provided on developments and activities by the pilot SSMEI projects. This may be requested from developers or decision-makers (see section 5.2 below). The guidance outlined in this section uses the same framework as the monitoring (shown in figure 3.1).

A set of questions is presented below, associated with each main criterion heading. The questions provide guidance to the pilots on how to promote sustainable development when considering developments and activities. The questions should be viewed as prompts for pilots in considering the whole range of issues associated with the marine environment and coastal communities' use of marine resources.

There should not be a significant additional burden placed on developers for the provision of detailed information. It is likely that information and data will not be available to provide an answer to some of the questions. In these instances the expertise of the assembled group should make an expert judgement or suggest what information should be provided as part of planning submissions.

Many of the questions below should be followed with a supplementary question: '*Are there workable changes to the proposal that would increase benefits or minimise negative impacts?*'.

Institutional

- Is the activity or development in line with the Marine Spatial Plan?

- Will the development or activity create areas of conflict and if so how can this be minimised?

- Are relevant stakeholders fully aware of the development or activity?

- Will the development or activity encourage greater understanding or increase transparency between stakeholders and regulators?

- Did consideration of the proposed activity or development lead to better co-ordination amongst regulators than took place prior to SSMEI and/or the Marine Spatial Plan?

Environmental - Water quality / pollution

- How, and to what extent, does the development contribute to cumulative impacts on environmental quality?

- How, and to what extent, does the development impact on the environmental capacity of the area?

- To what extent does the activity or development impact on water quality in the marine environment?

Environmental – Biodiversity

- Will the activity or development damage nationally/internationally protected areas?

- Will the activity or development affect the extent or management of designated sites?

- Will the activity or development impact upon nominated LBAP species or habitats?

- Are these species or habitats recognised indicators of ecosystem health?

- Could impacts on habitats/species be mitigated?

- Would impacts be irreversible or long term?

Environmental – Fisheries

- Will the activity or development impact upon fish stocks including spawning or nursery areas?
- Will the activity or development impact upon access to harvestable resources?

Social

- Does the development or activity impede the level of access to resources?

- Does the development create or safeguard jobs in the area? What type of jobs?

- Will the development encourage community cohesion?

- Does the marine development or activity have onshore implications (positive or negative)?

- Will the development or activity contribute to the well being of coastal communities ie. net benefit?

Economic

- To what extent will the proposal increase economic activity and what proportion could be retained in the local area?

- What best practice guidelines or codes of conduct could be proposed to encourage sustainable practice? (eg. coastal defence infrastructure and procedures – best practice)

- What is the lifespan of the proposal and will the businesses directly involved or indirectly supported be operating on a sustainable basis?

Scientific

- What is the extent of current scientific knowledge?

- Is it sufficient & if not what research would be required to satisfy concerns?

- What monitoring should be proposed?

5.2 Using the guidance

A second desk study, "Decision-making mechanisms in the Scottish Marine Environment" has been produced, which explains where the SSMEI pilots, including the SD criteria outlined here, can contribute to the decision-making process. The SSMEI pilot groups may be able to influence developments through responses to consultations following consideration of Sustainable Development guidance and raising awareness of sustainability issues within the pilot areas. There may be other opportunities to positively influence marine management including adoption of the marine spatial plan itself.

The purpose of the decision-making report is to inform the pilots of the current issues in sector-based management and to help identify where SSMEI may be able to provide additional benefits to achieve sustainable development and also perhaps make the regulatory process more streamlined for developers.

SSMEI can inform and influence the process of management and development at different stages. How SSMEI actually contributes when the pilots are established will depend upon the involvement, acceptance and adoption of the principles and criteria established by stakeholders and regulators.

The questions outlined above may not be put directly to the developers initially, but considered by the SSMEI group based on information provided. This will minimise additional burden on developers and highlight information gaps including elements that are persistently ignored. As the involvement of SSMEI in the process becomes better known, developers should recognise the benefit of considering the social economic and environmental impacts of their developments or activities. Such consideration may enable initial proposals to be more sustainable and be looked on more favourably by other stakeholders and regulators.

The SSMEI guidance criteria should ultimately raise awareness ahead of an operator's actions or a developer's application. This will enable pre-emptive actions that reduce the number of inappropriate actions or proposals in relation to the marine environment. To provide this function the guidance should be clear, unambiguous and simple to comprehend

by a variety of groups. Once finalised, dissemination of this guidance should form part of the SSMEI promotional activities.

The SSMEI pilot groups will hopefully gain recognition amongst regulators and hence have more specific involvement in the consultation process. By being actively consulted there is an onus on SSMEI to ensure the individual groups provide consistent advice both between groups and throughout the pilot period and beyond. This reflects the temporal and spatial coherence required to ensure the ecosystem approach is being considered. Regulators may also be encouraged to use the criteria and indicators on assessing proposals against the marine spatial plan.

As the pilots are at different scales with different participants and priorities, there is likely to be some variation in the detail of some guidance. The development of a set of sustainable development criteria will enable the SSMEI project to consider individual pilot additions and amendments to ensure they remain in line with the overarching and national SSMEI objectives of sustainable development and the application of the ecosystem approach in the management of Scotland's marine environment.

6 REFERENCES AND FURTHER READING

Brenton, F., 2004. State of the Coasts in Europe – Towards a EEA assessment report. for the European Environment Agency.

Brundtland Commission, 1987. World Commission on Environment and Development.

Cordah, 2001. Indicators to monitor the progress of integrated coastal zone management: a review of world-wide practice. For the Scottish Executive Central Research Unit.

Defra, 2004. Quality of Life Counts – Indicators for Sustainable Development in the UK.

Defra, 2005. Sustainable Consumption and Production Indicators – Revised basket of 'decoupling' indicators.

DEFRA, the Scottish Executive, the Welsh Assembly Government and the devolved administration in Northern Ireland, 2005. Charting progress: an integrated assessment of the state of UK seas.

Entec UK, 2001. Sustainability Indicators for Waste, Energy and Travel for Scotland. For the Scottish Executive Central Research Unit.

Jackson, T. & Roberts, P., 2000. A review of indicators of sustainable development: a report for Scottish Enterprise Tayside

Gallagher, A., 1999. "Indicators for Sustainable Development on the Coast. Their role in the Integrated Coastal Zone Management of Devon and Cornwall". Southampton Institute. Southampton.

Hambrey, J., 2003. Fisheries, aquaculture and sustainability – cutting through the jargon

Hambrey, J., Lawrence, K. & Evans, S., 2004. Scoping study – Framework for measuring social, economic amd environmental impacts of SNH activity and land designations. For Scottish Natural Heitage.

HM Government, Scottish Executive, Welsh Assembly Government and Northern Ireland Office, 2005. One future – different paths: The UK's shared framework for Sustainable Development.

Laffoley, D.d'A., Burt, J., Gilliland, P., Baxter, J., Connor, D.W., Davies, J., Hill, M., Breen, J., Vincent, M., and Maltby, E., 2003. Adopting an ecosystem approach for the improved stewardship of the maritime environment: some overarching issues. English Nature, Peterborough, English Nature Research Reports , No. 538, 20pp.

Laffoley,D.d'A.,Maltby,E.,Vincent,M.A.,Mee,L.,Dunn,E.,Gilliland, P.,Hamer,J.P,Mortimer,D.,and Pound,D.2004. The Ecosystem Approach. Coherent actions for marine and coastal environments. A report to the UK Government.Peterborough,English Nature.65pp.

Levett-Therivel, 2004. Assessment of progress against the headline indicators. Report to the Sustainable Development Commision.

OSPAR,2003. Declaration of the Joint Ministerial Meeting of the Helsinki and OSPAR Commissions. JMM,2003/3 E,7.

Roberts, P., 1995. Environmentally sustainable business: a local and regional perspective London, Paul Chapman

Rogers, S.I. & Greenaway, B., 2005. A UK perspective on the development of marine ecosystem indicators. Marine Pollution Bulletin 50, 9-19.

RSPB, 2004 Potential benefits of marine spatial planning to Economic Activity in the UK. GHK report to RSPB, December 2004.

Scottish Biodiversity Forum (Action Plan and Science Group), 2003. Towards a strategy for Scotland's biodiversity: Developing candidate indicators of the state of Scotland's biodiversity.

Scottish Coastal Forum Draft State of the Coast Report, 2005. Midgeley, S., Atkin, H, June 2005

Scottish Executive Environment Group, 2004. Developing a Strategic Framework for Scotland's Marine Environment.

Scottish Executive Environment Group, 2004. Indicators of Sustainable Development for Scotland: Progress Report 2004.

Sustainable Development Commission, 2003. Redefining prosperity: resource productivity, economic growth and sustainable development.

WWF, 2004 The Wildlife Trusts / WWF-UK Joint Marine Programme. Discussion Paper on Strategic Environmental Assessment.

UNEP, 2004. Convention on Biological Diversity. Conference of the Parties Seventh meeting, Kuala Lumpur.

Working Group on Indicators and Data, 2003. Under the lead of ETC-TE. Measuring Sustainable Development on the Coast. A report to the EU ICZM Expert Group.

Working Group on Indicators and Data, 2004. Report to the EU ICZM Expert Group.

ANNEX 1 ECOSYSTEM APPROACH – PRINCIPLES AND FRAMEWORK

The 12 principles recommended by the Conference of Parties of the Convention on Biological Diversity, to guide signatory countries in the practical application of the Ecosystem Approach.

Principle 1: The objectives of management of land, water and living resources are a matter of societal choice.
Principle 2: Management should be decentralized to the lowest appropriate level.
Principle 3: Ecosystem managers should consider the effects (actual or potential) of their activities on adjacent and other ecosystems.
Principle 4: Recognizing potential gains from management, there is usually a need to understand and manage the ecosystem in an economic context. Any such ecosystem-management programme should: reduce those market distortions that adversely affect biological diversity; align incentives to promote biodiversity conservation and sustainable use; and internalize costs and benefits in the given ecosystem to the extent feasible.
Principle 5: Conservation of ecosystem structure and functioning, in order to maintain ecosystem services, should be a priority target of the ecosystem approach.
Principle 6: Ecosystems must be managed within the limits of their functioning.
Principle 7: The ecosystem approach should be undertaken at the appropriate spatial and temporal scales.
Principle 8: Recognizing the varying temporal scales and lag-effects that characterize ecosystem processes, objectives for ecosystem management should be set for the long term.
Principle 9: Management must recognize that change is inevitable.
Principle 10: The ecosystem approach should seek the appropriate balance between, and integration of, conservation and use of biological diversity.
Principle 11: The ecosystem approach should consider all forms of relevant information, including scientific and indigenous and local knowledge, innovations and practices.
Principle 12: The ecosystem approach should involve all relevant sectors of society and scientific disciplines.

Seven Areas of Coherence – a framework to support practical implementation of the Ecosystem approach[19].

Environmental coherence
• Taking a fully representative approach to biodiversity
• Using surrogate information sources
• Defining the ecosystem outcomes being sought
• Avoiding damaging the genetics of species
• Implementing strict site protection measures

Economic coherence
• Defining economic objectives
• Developing management effectiveness indicators
• Using best practice for assessing environmental impacts
• Addressing combined and cumulative impacts
• Fishing within ecosystem limits
• Taking an integrated approach to nutrient enrichment

Social coherence
• Stakeholder participation and transparency in decisions
• Planning decision-making processes
• Effective participation by all relevant stakeholders
• Understanding and ownership of biodiversity benefits

Institutional coherence
• Reforming institutional arrangements
• Providing high-level support and co-ordination
• Providing adequate support at local levels

Spatial coherence
• European Marine Strategy spatial framework
• Implementing a spatial planning framework
• Spatial regulation and management of the resource
• Spatial distribution of the resource
• Providing a common coastline and bathymetry data set

Temporal coherence
• Working with 'locked-in' changes to the environment
• Working with past impacts and 'shifting baselines'
• Sustaining long-term political ambition
• Establishing a timeframe-relevant indicator set
• Implementing a regional sea management plan timetable

Scientific coherence
• Aligning science to society and sustainable development
• Undertaking regional seas-scale science
• Improving access to data
• Widening the scope of scientific advice
• Supporting greater ownership and use of advice
• Improve the synthesis of existing science

[19] Laffoley *et al.* 2004

ANNEX 2 INDICATORS DEVELOPED WITHIN CURRENT INITIATIVES

SSMEI Framework	SSMEI Criteria	Potential Current Indicators Relevant to SSMEI	Source
Institutional Process Criteria	**Greater Awareness**	• Public awareness of sustainable development	Entec UK, 2001
		• Public understanding and awareness • Awareness in schools	Quality of life counts, Defra 2004
		• Sustainable development literacy of the public	Web source
	Appropriate Participation	• Individual action for sustainable development	Quality of life counts, Defra 2004
		• Volunteer rate • Percent of people who volunteer at least 50 hours per year • Charitable contribution	Web source
Environmental Marine Criteria	**Water quality / pollution**	• Kilometres of river id. as poor or seriously polluted	Scottish Sustainable Development Indicators, 2004
		• Number and volume of marine oil spills • Degree of compliance with Bathing Water Directive microbiological standards • Degree of compliance with Shellfish Hygiene Directive and Shellfish Waters Directive • Concentration of nutrients in coastal waters • Volume of coastal and estuarine litter • Waste water treatment capacity and index of reuse of treated water	Working Group on Indicators and Data, 2003
		• Quality of bathing water – Percent of bathing waters compliant with the guide value of European Bathing Water Directive • Amount of coastal, estuarine and marine litter – Volume of litter collected per given length of shoreline • Concentration of nutrients in coastal waters – Concentration of nitrates and phosphates in coastal waters • Amount of oil pollution – Volume of accidental oil spills – Number of observed oil slicks from aerial surveillance	Working Group on Indicators and Data, 2004

		• Waste by sector • Estuarine water quality, marine inputs • Compliance with Bathing Water Directive	Quality of life counts, Defra 2004
		• Discharges and emissions of nutrients from human activities • Sewage discharges	Integrated Assessment, Defra 2005
		• Percentage of estuarine areas not suitable for shellfish harvesting • Number of days all beaches are open for swimming • Amount of road salt used on rural regional roads	Web source
	Biodiversity	• % of BAP species or habitats stable or increasing	Scottish Sustainable Development Indicators, 2004
		• Trends in UK BAP priority species and habitats	Entec UK, 2001
		• Abundance of seabirds • Otter status • Salmonid counts	Scottish Biodiversity Forum, 2003
		• Proportion of coastal zone (land and sea) protected for nature conservation, landscape or heritage reasons • Rate of loss of, or damage to, protected areas • Change to significant coastal and marine habitats and species	Working Group on Indicators and Data, 2003
		• Area of land and sea protected by statutory designations – Area protected for nature conservation, landscape and heritage • Effective management of designated sites – Rate of loss of, or damage to, protected areas • Change to significant coastal and marine habitats and species – Status and trend of specified habitats and species – Number of species per habitat type – Number of Red List coastal area species	Working Group on Indicators and Data, 2004
		• Populations of wild birds • Biodiversity in coastal / marine areas • Biodiversity action plans • Extent of management of SSSIs • Native species at risk	Quality of life counts, Defra 2004
	Fisheries	• Volume and value of fish landings	Working Group on Indicators and Data, 2003

		• Proportion of fish stocks within safe biological limits	Scottish Sustainable Development Indicators, 2004
		• Fish stocks and fish landings – State of main fish stocks by species and sea area – Recruitment and spawning stock biomass by species – Landings and fish mortality by species – Value of landings by port and species	Working Group on Indicators and Data, 2004
		• Fish stocks around the UK fished within safe limits	Quality of life counts, Defra 2004
		• Wild salmon returning to spawn • Areas of closed shellfish beds	Web source
	Climate Change	• Annual number of stormy days at the coast • Rate of change in mean sea level • Area affected by flooding in the last 10 years • Length of protected and defended coast	Working Group on Indicators and Data, 2003
		• Sea level rise and extreme weather conditions – Number of 'stormy days' – Rise in sea level relative to land	Working Group on Indicators and Data, 2004
		• Electricity from renewable	Quality of life counts, Defra 2004
		• Renewable energy use	Web source
Social Quality of Life Criteria	**Education**	• Number of people taking part in voluntary activities	Scottish Sustainable Development Indicators, 2004
		• Qualifications at age 19	Quality of life counts, Defra 2004
		• Number of environmental education programs for community	Web source
	Community	• % that are working age	Scottish Sustainable Development Indicators, 2004

		• Proportion of population living in the coastal zone • Population density in the coastal zone • Index of social deprivation in the coastal zone	Working Group on Indicators and Data, 2003
		• Expected years of healthy life • Voluntary activity • Community spirit	Quality of life counts, Defra 2004
		• Youth involvement in community service • Percent of population who are physically active	Web source
	Access	• % of households within 6 minutes walk of a bus stop	Scottish Sustainable Development Indicators, 2004
		• Number of coastal and estuarine berths and moorings	Working Group on Indicators and Data, 2003
		• Passenger travel by mode • Average journey length by purpose • How children get to school • Number of people finding access difficult • Access for disabled people • Participation in sport and cultural activities	Quality of life counts, Defra 2004
Economic Prosperity Criteria	**Employment / income**	• % of unemployed working age people • Freight intensity: road freight tonnes / GDP	Scottish Sustainable Development Indicators, 2004
		• Rate of change in sectoral employment in the coastal zone • Percentage change in the number of visitors • Rate of seasonal variations in employment in tourism	Working Group on Indicators and Data, 2003

		• Pressure for coastal and marine recreation – number of berths and moorings for recreational boating • Patterns of sectoral employment – full time, part time and seasonal employment per sector – Value added per sector • Volume of port traffic – Number of incoming and outgoing passengers per port – Total volume of goods handled per port – Proportion of goods carried by short sea routes	Working Group on Indicators and Data, 2004
		• Proportion of people of working age who are in work	Quality of life counts, Defra 2004
		• Average age of commercial fish harvesters • Percent of residents who want to work full time who actually work full time • Employment in hotel and lodging industry	Web source
	Good practice	• Sustainable tourism – Number of tourist accommodations holding EU Eco-label – Ratio of overnight stays to number of residents	Working Group on Indicators and Data, 2004
		• Percent of organisations tat have adopted sustainable development goals • Sales of locally produced food at farmers market	Web source
	Business confidence	• CO2 emissions divided by GDP	Scottish Sustainable Development Indicators, 2004
		• Rate of development of previously undeveloped land	Working Group on Indicators and Data, 2003
		• Intensity of Tourism – Number of overnight stays in tourist accommodation – Occupancy rate of bed places	Working Group on Indicators and Data, 2004
		• New business start-ups net of closures	Quality of life counts, Defra 2004

=O=O=O=