

## Meeting No 9: 31st October 2008

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**Ecosystem Approach**

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**1 Introduction**

The FoCMSP has adopted the ecosystem approach to sustainable development. This paper outlines the key elements of the ecosystem approach and describes how it has been applied to the development of the FoCMSP.

**2 Ecosystem Approach**

The **ecosystems approach** is defined by the 1992 Convention on Biological Diversity (CBD) as:

*“a strategy for the integrated management of land, water, and living resources that promotes conservation and sustainable use in an equitable way.”*

The approach embraces the sustainable development concept of enabling all people to satisfy their basic needs and enjoy a better quality of life without compromising the ability of future generations to meet their needs. It recognises that holistic management of natural resources is required to ensure maintenance of critical ecosystem services.

Its core concept lies in integrating and managing the range of demands we place on the environment and indefinitely supporting essential services, goods and benefits for all, without deterioration to the natural environment

The UK government and European Union has signed-up to the Ecosystem Approach as a Party to the Convention on Biological Diversity. It has also been adopted by other conventions and international agreements such as the Climate Change Convention and Ramsar.

**3 Ecosystems**

Eugene Odum, regarded by many as the father of modern ecology, defined an **ecosystem** as:

*“a system composed of [living] communities and their [non-living] environment interacting with each other”*

At its broadest, the term applies to the earth as a whole, but the concept is more commonly applied at smaller spatial scales, often with a focus on particular ecological processes and/or living components. Thus a saltmarsh or Oakwood may be regarded as an ecosystem. Within the highly dynamic marine environment, FRS define marine ecosystems as:

*“the community of species which make up a marine food web, together with the physical oceanographic environment which defines its geographical limits”*

Marine ecosystems can range in size from a rockpool to an ocean, depending upon the innate mobility of species within food webs and the occurrence of oceanographic features such as fronts and currents.

**4 Ecosystem Services**

Implicit in the ecosystem concept is recognition that the whole is greater than the sum of its parts, and that the stability of mature, undamaged, ecosystems is underpinned by relationships of interdependence among component organisms. The living components of ecosystems normally include organisms (plants, algae or bacteria)

capable of deriving energy directly from the sun or other non-living energy sources, consumers (herbivorous and carnivorous animals) and decomposers (fungi, bacteria) that return energy and materials to the environment. The flows and processing of energy and materials through ecosystems are the fundamental basis for the delivery of the **ecosystem services** crucial to human survival and well being.

The UN Millennium Ecosystem Assessment has classified **ecosystem services** as including:

**Supporting services:** The services that are necessary for the production of all other ecosystem services (e.g. soil formation, photosynthesis, nutrient and water cycling)

**Provisioning services:** The products obtained from ecosystems (e.g. food, fibre, fuel, biochemicals, medicines, fresh water etc.)

**Regulating services:** The benefits obtained from the regulation of ecosystem processes (e.g. climate regulation, air quality regulation, erosion regulation, water purification etc.)

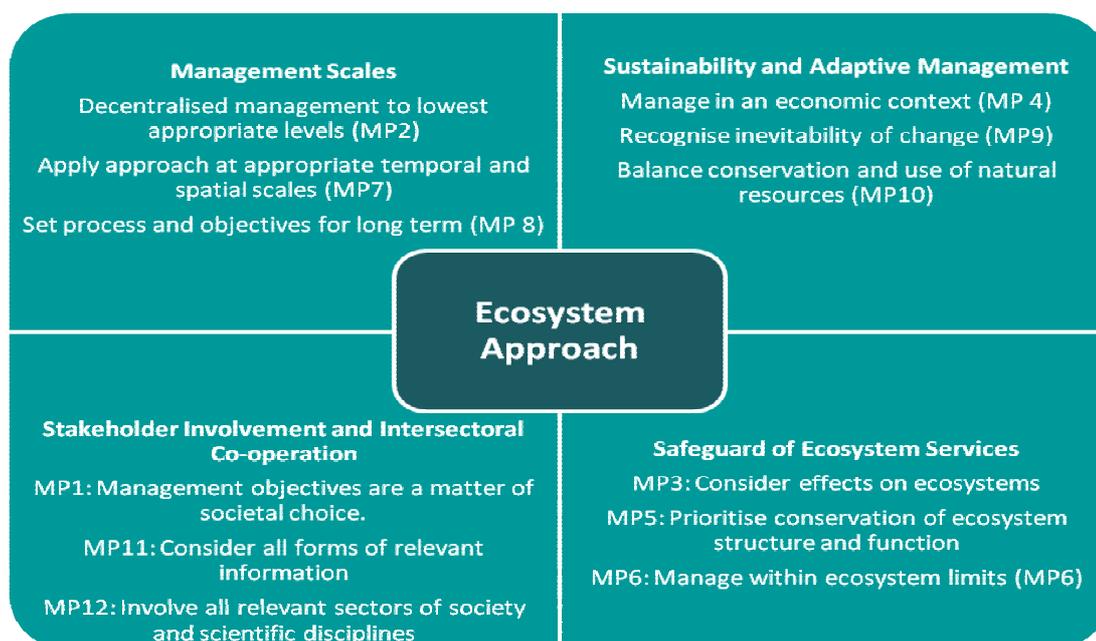
**Cultural services:** The non-material benefits people obtain from ecosystems through spiritual enrichment, cognitive development, reflection, recreation and aesthetic experiences (including landscape values).

## 5 The Malawi Principles

The CBD have developed a set of twelve complementary and interlinked principles/characteristics of the ecosystem approach to biodiversity and resource management. These are known as the **Malawi Principles**.

<b>MP1</b>	Management objectives are a matter of societal choice.
<b>MP2</b>	Management should be decentralized to the lowest appropriate level.
<b>MP3</b>	Ecosystem managers should consider the effects of their activities on adjacent and other ecosystems.
<b>MP4</b>	Recognizing potential gains from management there is a need to understand the ecosystem in an economic context, considering e.g. mitigating market distortions, aligning incentives to promote sustainable use, and internalising costs and benefits.
<b>MP5</b>	Conservation of ecosystem structure and functioning, in order to maintain ecosystem services, should be a priority target of the ecosystem approach.
<b>MP6</b>	Ecosystems must be managed within the limits to their functioning.
<b>MP7</b>	The ecosystem approach should be undertaken at the appropriate temporal and spatial scales.
<b>MP8</b>	Recognizing the varying temporal scales and lag effects which characterize ecosystem processes, objectives for ecosystem management should be set for the long term.
<b>MP9</b>	Management must recognize that change is inevitable.
<b>MP10</b>	The ecosystem approach should seek the appropriate balance between, and integration of, the conservation and use of biodiversity.
<b>MP11</b>	The ecosystem approach should consider all forms of relevant information, including scientific and indigenous and local knowledge, innovations and practices.
<b>MP12</b>	The ecosystem approach should involve all relevant sectors of society and scientific disciplines.

The Malawi Principles are a framework, not a method, which act as a guide for working towards sustainable development, based on the maintenance of fully functioning ecosystems. They aim to ensure natural resources and human well being are both fully taken into account. As such, humans are recognized, within the principles, as an integral component of ecosystems.



**Figure 1. The Malawi Principles**

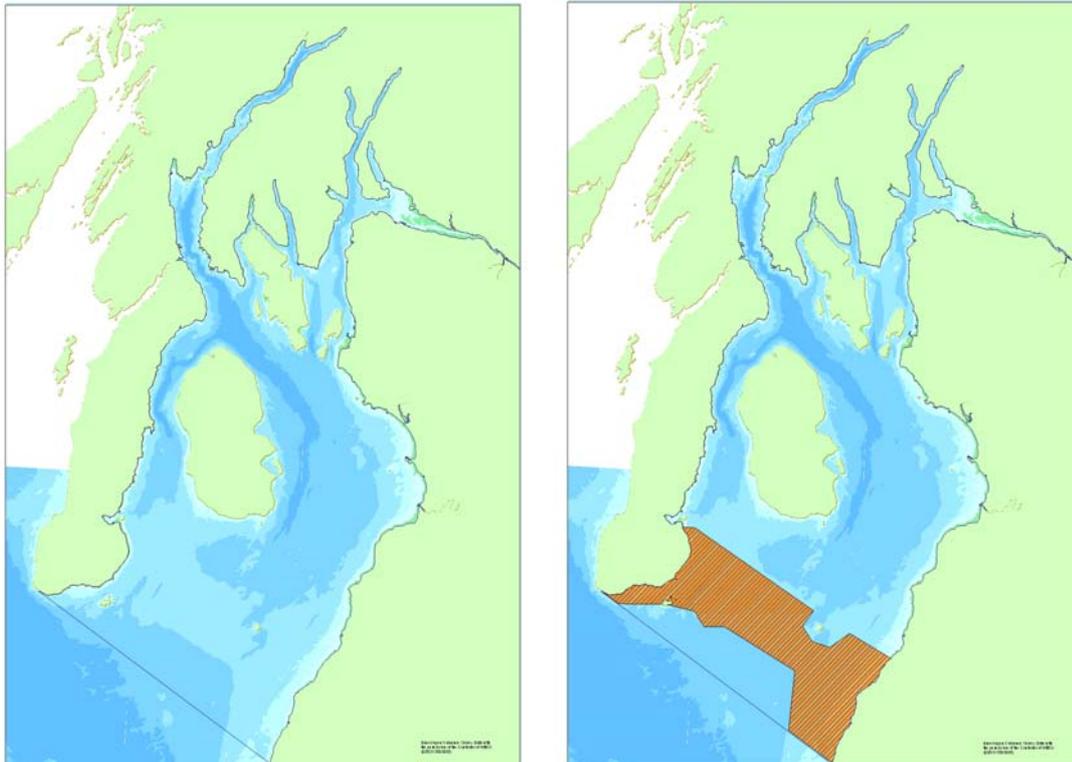
As illustrated in Figure 1, the Malawi Principles (MP) may be viewed as falling within four main interrelated themes: Management scales; Sustainable and adaptive management; Stakeholder involvement and intersectoral co-operation; and, Safeguarding of ecosystem services

## 6 Application of the Malawi Principles to the FoCMSP

The following tables outline how the Malawi Principles have been applied to the process of developing the FoCMSP within each of these four main themes

### Theme 1: Management Scales

Guiding Principles	Application to FoCMSP
<b>Set processes and objectives for long term (MP 8)</b>	SSMEI Pilots informing development of future marine management policy in Scotland.  FoCMSP sets policies for a 5-year period in support of a 20-year vision for the Firth
<b>Apply approach at appropriate temporal and spatial scales (MP7)</b>	Within the Irish Sea, the Firth of Clyde has a distinct biogeographic character arising from its underlying geomorphology and surrounding landmass. The Firth is relatively sheltered, with a limited tidal range and relatively low surface salinity, and contains several deep-water lochs. These characteristics have shaped the nature and scale of those human activities within the Firth that the FoCMSP seeks to manage.  The FoCMSP looks holistically at the Firth of Clyde marine and coastal environments as a unit and sets policy objectives at this scale.  Policies look initially to a 5-year period, with expectation of periodic review.
<b>Decentralise management to lowest appropriate levels (MP2)</b>	The FoCMSP Implementation Schedule identifies appropriate lead agencies and partners for local delivery of policies.



**Figure 2. The “sill” at the mouth of the Firth of Clyde**

The entrance to the Firth of Clyde from the Irish Sea is via a relatively shallow sill, which has a maximum depth of less than 50m.

This impacts upon water flow from the Irish Sea and results in the deeper waters within the Firth having a flushing time of 3-4 months.

## Theme 2: Sustainable and Adaptive Management

Guiding Principles	Application to FoCMSP
<p><b>Manage in an economic context (MP 4)</b></p>	<p>The FoCMSP takes a proactive approach that aims to enable sustainable development of marine-based industries and activities within the Firth to benefit the local and wider economy.</p> <p>The socio-economic study and sectoral workshops have informed policy development</p>
<p><b>Recognise inevitability of change (MP9)</b></p>	<p>The baseline State of the Clyde report considers trends in status of key environmental features.</p> <p>Policies look initially to a 5-year period, with expectation of ongoing review and adaptation</p>
<p><b>Balance conservation and use of natural resources (MP10)</b></p>	<p>Environment is a cross-cutting theme within the FoCMSP, and the overarching strategy recognises the central importance of the natural and historic heritage of the Firth to sustainable development of marine-related sectors</p> <p>The SEA process is integral to the development of policies within the FoCMSP and identifies avoidance, mitigation and enhancement measures for draft policies that promote economic use of marine/coastal resources. These measures are fed back into development of final policies and associated proposals.</p>

### Theme 3: Stakeholder Involvement and Intersectoral Co-operation

Guiding Principles	Application to FoCMSP
<p><b>Management objectives are a matter of societal choice (MP1)</b></p> <p><b>Consider all forms of relevant information (MP11)</b></p> <p><b>Involve all relevant sectors of society and scientific disciplines (MP12)</b></p>	<p>FoCMSP development guided by a stakeholder-regulator steering group and informed by numerous sources of published and other information including:</p> <ul style="list-style-type: none"> <li>➤ data compilation within baseline State of the Clyde report</li> <li>➤ seabed mapping and biodiversity data capture contracts</li> <li>➤ socio-economic study</li> <li>➤ workshops to ascertain sectoral aspirations</li> <li>➤ sectoral interactions study</li> <li>➤ SEA process</li> </ul> <p>There will also be facilitated public consultation on the draft FoCMSP and SEA Report.</p>

### Theme 4: Safeguarding of Ecosystem Services

Guiding Principles	Application to FoCMSP
<p><b>Consider effects on ecosystems (MP3)</b></p>	<p>Environment is a crosscutting theme within the FoCMSP and the SEA process examines potential impacts of policy options on a range of environmental themes, including marine and coastal habitats/species and water quality and draws on relevant expertise to inform assessments.</p>
<p><b>Prioritise conservation of ecosystem structure and function (MP 5)</b></p> <p><b>Manage within ecosystem limits (MP6)</b></p>	<p>(Current) ability to deliver priorities with respect to protection of ecosystem structures and functions is severely constrained by lack of supporting data.</p> <p>Initial steps have been taken to identify and address key data gaps, including preparation of an indicative seabed habitat map and capture and evaluation of available biodiversity data.</p>

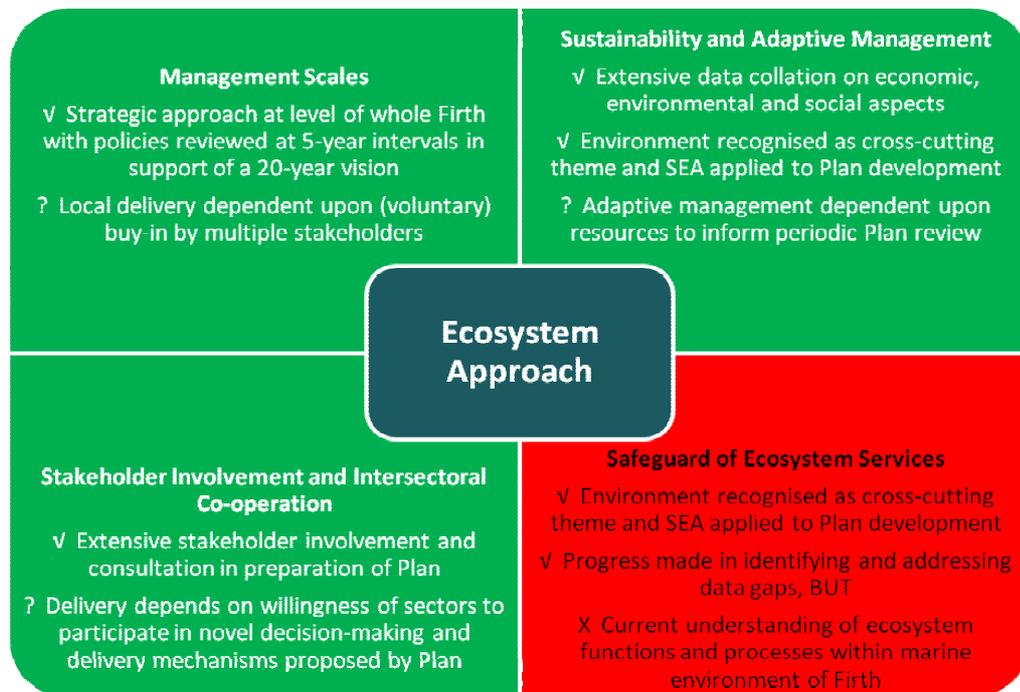
## 7 Conclusions

The extent to which it is proving possible to deliver the ecosystem approach within the FoCMSP is summarised in Figure 3. We have identified some potential barriers to full implementation of the Malawi Principles, predominately in safeguarding of ecosystem services.

In developing the FoCMSP, extensive efforts have been made to engage with a broad range of stakeholders and to draw upon and collate relevant information held by numerous agencies and individuals. In addition, the application of SEA to strategy and policy development, together with recognition of the environment as a crosscutting theme, has contributed to the Plan's sustainability.

However, the current level of understanding of marine ecosystems within the Firth, and of the potential impacts of human activities, both at sea and on land, on their functioning, is insufficient to enable the FoCMSP to be confident of delivering the desired safeguard of the full range of ecosystem services (see section 2).

The overarching strategy recognises the importance of the Firth's defining features to the well-being of surrounding communities and the Plan takes a proactive approach to recognition and safeguard of *cultural services*, such as landscape and seascape. The Plan also includes some policies and proposals that broadly relate to *provisioning services*, although fisheries management will be delivered through other mechanisms. However, the FoCMSP is unable to address safeguard of *supporting* and *regulating* ecosystem services.



**Figure 3. Delivery of the Ecosystem Approach**

In this context, the principle of adaptive management, to enable future revisions of the Plan in light of improved knowledge is key, but this will be critically dependent upon provision of adequate resources to monitor Plan outcomes, to increase the knowledge base, and to apply improved understanding to future planning.

Finally, delivery of the FoCMSP is dependent upon the willingness and ability, in part determined by financial and other resources, of key stakeholders to participate in novel co-operative groupings. This aspect is key to delivery of the ecosystem approach at an appropriate scale for the future development of marine activities within the Firth.