

DEFINITIONS AND PRINCIPLES FOR EBM IN THE ARCTIC.

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Arctic Council Ecosystem Based Management Experts Group

Arctic Council Secretariat

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DEFINITIONS AND PRINCIPLES FOR EBM IN THE ARCTIC

- Arctic Council Ecosystem Based Management Expert Group -

Background

In May 2011, Arctic Council Ministers called for the establishment of an expert group on ecosystem-based management (EBM) for the Arctic environment. Composed of government experts from Arctic States and representatives from the Arctic Council's Permanent Participants, the mandate of the Arctic EBM Experts Group (Experts Group) is to develop a common understanding of EBM and EBM principles relevant to work in Arctic marine and terrestrial ecosystems, and to recommend further Arctic Council activities related to EBM in advance of the 2013 Arctic Council Ministerial meeting.

The Experts Group met in October 2011 to review existing definitions and guidelines for the application of EBM, including those from within the Arctic Council as well as others drawn from relevant international processes. The group also reviewed connections to other Arctic Council working groups and initiatives, such as the Protection of the Arctic Marine Environment (PAME) working group, and the recently completed report on Best Practices in Ecosystem-based Oceans Management in the Arctic (BePOMAr).

While a sub-group of participating experts met to explore existing EBM definitions and principles, it was agreed that an inter-sessional effort would be required to adapt these to pan-Arctic needs. In framing this inter-sessional exercise, the group agreed to:

- Use existing definitions of EBM, rather than developing a new, Arctic-specific definition;
- Highlight why EBM is important for the Arctic; and
- Use existing principles (with a focus on those that are particularly relevant to the Arctic context), beginning with the BePOMAr conclusions and relevant principles from the Convention on Biological Diversity (the CBD). The group noted that it would be important to ensure that these principles apply equally to terrestrial and marine ecosystems.

The purpose of this document is to provide an initial draft of the Definition and Principles paper, for consideration at the Expert Group's April 2012 meeting in Gothenberg, Sweden. It reflects input received from Expert Group members, as well as the results of an analysis of relevant EBM-related principles.

1) Why is EBM Important in the Arctic?

Challenges in the Arctic Context

The Arctic region consists of a number of distinct marine and terrestrial ecosystems, with significant ecological and demographic variability between them. For example, the Beaufort Sea and the marine environment surrounding northern Norway are extremely different in terms of both physical and biological characteristics.

Arctic ecosystems are inherently diverse, variable, and dynamic. Ecosystem components are constantly changing, making it sometimes difficult to assess between large natural fluctuations and changes due to human activities¹. This underscores the importance of understanding the full breadth and nature of Arctic ecosystems at a variety of scales as part of efforts to ensure their long-term sustainability.

Some Arctic ecosystems are highly productive and provide critical ecological services that sustain the residents and communities of the Arctic. Arctic marine ecosystems also have pulses of seasonal productivity that provide subsidies to other, less productive ecosystems. Many species undergo extensive seasonal migrations to take advantage of this pulse of productivity. This marine-derived productivity is critical to the functioning of many terrestrial systems.

At the same time, Arctic ecosystems are vulnerable to a number of existing and potential pressures. For example, the Arctic climate is warming rapidly, and impacts on the region are already being documented as a result of climate change. These include thinning and reduced extent of sea ice, which in turn has significant implications for Arctic wildlife and human populations.

Other key stressors include pollution (transported primarily from sources outside the Arctic), as well as increased economic activities such as shipping, oil and gas development, commercial fishing and tourism. These stressors – both individually and in combination - have the potential to affect both Arctic ecosystems and the communities that depend on them.

The Benefits of EBM in the Arctic

Many of the challenges described above are complex, in that they entail a number of ecosystem components that are affected by multiple drivers of change. Also, ecosystems sometimes span territorial boundaries, and often involve a broad range of stakeholders. To address these challenges, there is a need for flexible and adaptive management approaches in the Arctic that recognize cultural, governmental/legal and sub-regional differences, apply an integrated and interdisciplinary approach to understanding and managing these ecosystems, and ultimately maintain the resilience of Arctic ecosystems and communities.

Ecosystem-based management holds considerable promise in this regard. At a general level, EBM facilitates efficient and science-based decisions by providing a way of assessing and managing the effects of multiple stressors affecting the same ecosystem. Locally, through the design of inclusive processes that reflect a broad range of scientific as well as traditional and local knowledge, EBM can ensure that policy outcomes achieve not only ecological, but also social and economic goals, and help Arctic peoples adapt to changing ecological and socio-economic conditions. Finally, because ecosystems and human activities are dynamic, our understanding of these systems and activities is constantly evolving. The flexible and adaptive nature of EBM is, therefore, well-suited to address the rapid changes occurring in the Arctic.

¹ The Arctic Ocean Review, Phase I Report (2009-2011), produced by PAME (Protection of the Arctic Marine Environment).

The Arctic Council has a history of engagement around EBM. For example, EBM is a guiding principle informing the work of CAFF (Conservation of Arctic Flora and Fauna) and is reflected in both the Arctic Marine Strategic Plan and the approach taken by the Circumpolar Biodiversity Monitoring Programme (CBMP). Other relevant Arctic Council projects include PAME's work on Large Marine Ecosystems (LMEs), its expert group on the ecosystem approach, as well as the Best Practices in Ecosystem-based Oceans Management in the Arctic (BePOMAr) project.

By informing common approaches within the Arctic Council, EBM can:

- facilitate discussion among Arctic States on the appropriate management of ecosystems and/or species;
- facilitate and integrate a range of planned and ongoing Arctic Council initiatives (such as, for example, the development of guidelines for EBM);
- provide for the participation of indigenous peoples and northern communities;
- establish the Arctic Council as a global leader in EBM and reinforce its role in addressing the sustainability of the Arctic environment;
- enhance the efficiency and effectiveness of monitoring and assessment programs; and,
- facilitate scientific cooperation, including the identification and resolution of data compatibility issues (i.e. differences in national scientific or planning standards or protocols that inhibit data sharing).

Regional EBM approaches can also enable collective consideration of major external forcing functions affecting Arctic ecosystems, such as persistent organic pollutants and climate change.

2) Towards a Common Arctic Council Definition:

According to the Parties to the UN Convention on Biological Diversity, who adopted it as the primary framework for implementing the CBD in 1995, the ecosystem approach refers to a strategy for the integrated management of land, water and living resources that promotes conservation and sustainable use in an equitable way. Implementing the ecosystem approach is intended to help balance conservation, sustainable use, and the fair and equitable sharing of the benefits arising out of the use of genetic resources.

As per the Nuuk SAO report to Ministers, the term ecosystem-based management will be used in this paper. Although the term ecosystem approach is sometimes used to describe the implementation of the ecosystem approach, most experts see the two as synonymous. For example, the Arctic Council's PAME working group uses the term ecosystem approach to describe the same concepts and activities described herein. Other similar terms

Definitions of EBM

"The ecosystem approach is a strategy for the integrated management of land, water and living resources that promotes conservation and sustainable use in an equitable way. Thus, 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." (CBD)

"In ecosystem-based management, the associated human population and economic/social systems are seen as integral parts of the ecosystem. Most importantly, ecosystem-based management is concerned with the processes of change within living systems and sustaining the goods and services that healthy ecosystems produce. Ecosystem-based management is therefore designed and executed as an adaptive, learning-based process that applies the principles of the scientific method to the processes of management." (UNEP)

"Ecosystem-based management is a long-term, integrated approach that recognizes humans are part of and have significant influences on their environments. It is a shift away from conventional management paradigms that are often jurisdictional, short term and consider humans to be independent of nature. An ecosystem-based management plan includes adaptive management strategies and trade-offs, whether between ecosystem services, management strategies or other components of the plan, that are made as explicitly as possible." (Seaweb)

include integrated ecosystem or landscape management, integrated resource management, integrated water resources management, and integrated coastal zone management.

There are many definitions of EBM (see side-bars); however, in simple terms, it refers to an integrated, science-based approach to environmental management that aims to sustain the health, resilience and diversity of ecosystems while supporting sustainable and equitable use by humans of the services they provide.

A key feature of EBM is consideration of entire ecosystems, which involves assessing the total cumulative load on ecosystems from various pressures, and considering how the use of one element of the ecosystem is likely to affect another (for example, how siting an aquaculture facility in a particular area might affect its surrounding environment). A second important aspect of EBM is its recognition that humans are an essential part of ecosystems. A third aspect is that EBM can involve multi-sectoral processes engaging a broad range of participants in developing management options and reconciling conflicting uses.

The ecosystem approach and/or EBM have been referenced in a broad range of international fora, including in Agenda 21, the CBD, the Law of the Sea, the World Summit on Sustainable Development, UNEP, and others. As noted above, the concept has also been applied in the Arctic Council context, including through the Arctic Marine Strategic Plan, CAFF and the PAME Working Group. As such, it is not an ecosystem-specific concept, but rather one that applies equally to marine, terrestrial and coastal ecosystems.

Agreeing on a clear and succinct definition is the first step towards promoting a common approach to EBM within the Arctic Council. At its October 2011 meeting, the Expert Group confirmed that it would use the following definition, which is based on calls for the implementation of the ecosystem approach in the Action Plan adopted at the 2002 World Summit on Sustainable Development. It is also the definition used by the International Council for the Exploration of the Sea (ICES), which formed the basis of the definition subsequently adopted by PAME and others, and represents a globally recognized and endorsed definition.

This definition states that ecosystem-based management is 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 ecosystems thereby achieving sustainable use of ecosystem goods and services and maintenance of ecosystem integrity..."

Definitions of EBM

An approach that, "requires that development activities be coordinated in a way that minimizes their impact on the environment and integrates thinking across environmental, socio-economic, political and sectoral realms." (PAME)

The ecosystem approach is defined as "the comprehensive integrated management of human activities based on the 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 marine ecosystems, thereby achieving sustainable use of ecosystem goods and services and maintenance of ecosystem integrity". (OSPAR Commission)

"EBM looks at all the links among living and nonliving resources, rather than considering single issues in isolation...Instead of developing a management plan for one issue...EBM focuses on the multiple activities occurring within specific areas that are defined by ecosystem rather than political boundaries." (U.S. Commission on Ocean Policy)

3) Principles²

In order to proceed with a common understanding of the core elements of EBM, an analysis was conducted of all relevant EBM-related principles that were identified by Expert Group members and Observers. Sources included:

- Convention on Biological Diversity, *Principles of the Ecosystem Approach*;
- United Nations Open-ended Informal Consultative Process on Oceans and the Law of the Sea, agreed consensual elements from its 7th meeting;
- Best Practices in Ecosystem-based Oceans Management in the Arctic (BePOMAr);
- World Wildlife Fund *Principles for Ecosystem-based Management*, and
- Ecological Society of America (ESA)³.

Based on this assessment, a series of principles were identified that could represent common elements of a potential approach by the Arctic Council. These principles include:

1. EBM supports ecosystem resilience in order to maintain ecological functions and services.
2. EBM recognizes that humans and their activities are an integral part of the ecosystem as a whole, and that sustainable use and values are central to establishing management objectives.
3. EBM is place-based, with geographic areas defined by ecological criteria, and may require efforts at a range of spatial and temporal scales (short-, medium- and long-term).
4. EBM balances and integrates the conservation and sustainable use ecosystems and their components.
5. EBM aims to understand and address the cumulative impacts of multiple human activities (rather than individual sectors, species or ecosystem components).
6. EBM seeks to incorporate and reflect, to the extent it is relevant, expert knowledge including scientific, traditional and local knowledge.
7. EBM is inclusive and encourage participation at all stages by various levels of government, indigenous peoples, stakeholders (including the private sector) and other Arctic residents.
8. Transboundary perspectives and partnerships can contribute significantly to the success of EBM efforts.
9. Recognizing that ecosystems and human activities are dynamic, that the Arctic is undergoing rapid changes, and that our understanding of these systems is constantly evolving, successful EBM efforts are flexible and adaptive.

² The term “principles” is used to mirror that language in the Nuuk SAO report to Ministers. For the purposes of this paper, the term principles is synonymous with key / common elements.

³ As outlined in Christensen *et al.* 1996. *The report of the Ecological Society of America Committee on the scientific basis for ecosystem management*. Ecological Applications 6(3), 665-691.

The analysis outlining the linkages and commonalities amongst the principles reviewed, as well as additional context on the rationale for their inclusion, is outlined in Table 1. A comprehensive listing of the principles reviewed is included in *Annex 3*.

Table 1 Analysis of EBM Principles

1. EBM supports ecosystem resilience in order to maintain ecological functions and services.		
Principles Reviewed	Source	Additional Context / Rationale⁴
Conservation of ecosystem structure and functioning, in order to maintain ecosystem services, should be a priority target of the ecosystem approach.	CBD ⁵	<ul style="list-style-type: none"> Biodiversity conservation and the maintenance of human wellbeing depend on the functioning and resilience of

⁴ The sources of these points are: Refinement and Elaboration of the Ecosystem Approach, based on Assessment of Experience of Parties in Implementation (CBD COP 7 Decision VII/11) and the BePOMAr report.

⁵ Convention on Biological Diversity, Principles of the ecosystem approach

Ecosystem must be managed within the limits of their functioning.		
Emphasize conservation of ecosystem structures and their functioning and key processes in order to maintain ecosystem goods and services	UN ⁶	
Seek to restore degraded marine ecosystems where possible		
Maintaining the natural structure and function of ecosystems, including the biodiversity and productivity of natural systems and identified important species, is the focus for management	WWF ⁷	
Ecosystem management is based on sound ecological principles and emphasizes the role of processes and interactions at all levels of organization	ESA ⁸	
Biological diversity, structural complexity, and connectedness of ecosystems are important for ecosystem resistance and resilience		

2. EBM recognizes that humans and their activities are an integral part of the ecosystem as a whole, and that sustainable use and values are central to establishing management objectives.

Principles Reviewed	Source	Additional Context / Rationale
Humans are an integral ecosystem component	ESA	<ul style="list-style-type: none"> The ecosystem approach recognizes that humans, with their cultural diversity, are an integral component of many ecosystems. Human society is diverse in the kind and manner of relationships that different groups have with the natural world, each viewing the world around them in different ways and emphasizing their own economic, cultural, and societal interests and needs.
Human use and values of ecosystems are central to establishing objectives for use and management of natural resources.	WWF	
An integrated and multidisciplinary approach to management that takes into account the entire ecosystem, including humans	BePOMAr ⁹	
There is usually a need to understand and manage the ecosystem in an economic context	CBD	

⁶ United Nations Open-ended Informal Consultative Process on Oceans and the Law of the Sea

⁷ World Wildlife Fund Principles for Ecosystem-based Management

⁸ Christensen *et al.* 1996. The report of the Ecological Society of America Committee on the scientific basis for ecosystem management. *Ecological Applications*, 6(3), 665-691.

⁹ Best Practices in Ecosystem-based Oceans Management in the Arctic

		<ul style="list-style-type: none"> 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: <ul style="list-style-type: none"> (a) Reduce those market distortions that adversely affect biological diversity; (b) Align incentives to promote biodiversity conservation and sustainable use; and (c) Internalize costs and benefits in the given ecosystem to the extent feasible.
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3. EBM is place-based, with geographic areas defined by ecological criteria, and may require efforts at a range of spatial and temporal scales (short-, medium- and long-term).		
Principles Reviewed	Source	Additional Context / Rationale
Area-based approaches ... are necessary	BePOMAr	<ul style="list-style-type: none"> It is critical to identify management units based on ecological criteria. EBM operates in geographical units at various scales. Ecosystem components and processes function at a range of spatial and temporal scales, as do human social and economic systems. Management approaches/interventions need to take into account and transcend these scales. Long-term ecological processes can be poorly accommodated in
The geographical scope of ecosystems defined by ecological criteria		
Area-based management and use of scientific and other information on ecosystem changes to continually adapt management of human activities		
The ecosystem approach should be undertaken at the appropriate spatial and temporal scales	CBD	
Recognizing the varying temporal scales and lag-effects that characterize ecosystem processes, objectives for ecosystem management should be set for the long term		
Be applied within geographically specific areas based on ecological criteria	UN	
Processes operate over a wide range of spatial and temporal scales; there is no single appropriate scale or timeframe for management	ESA	

Ecosystem management assumes intergenerational sustainability as a precondition for management		<p>management systems, given that these systems tend to operate on relatively short time scales.</p> <ul style="list-style-type: none"> • Awareness of long-term processes is important to consider explicitly in formulating management plans.
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4. EBM balances and integrates the conservation and sustainable use ecosystems and their components.		
Principles Reviewed	Source	Additional Context / Rationale
The ecosystem approach should seek the appropriate balance between, and integration of, conservation and use of biological diversity	CBD	<ul style="list-style-type: none"> • Conservation and use need to be seen in context (i.e. a continuum from strict protection to human-altered, but functioning healthy ecosystems). • Management for conservation and sustainable use are not inherently incompatible and can be integrated. • Integration can be achieved at various scales and in various ways, including spatially and within a site.
Seek the appropriate balance between, and integration of, conservation and sustainable use of marine biological diversity	UN	
Emphasize the interactions between human activities and the ecosystem and among the components of the ecosystem and among ecosystems		
Seek to minimize adverse impacts of human activities on marine ecosystems and biodiversity, in particular rare and fragile marine ecosystems.		
Decision-making must be integrated and science-based	BePOMAr	

5. EBM aims to understand and address the cumulative impacts of multiple human activities (rather than individual sectors, species or ecosystem components).		
Principles Reviewed	Source	Additional Context / Rationale
The assessment of cumulative impacts of different sectors on the ecosystem, instead of single species, sectoral approaches	BePOMAr	<ul style="list-style-type: none"> • There are limits to the level of demand/disturbance that can be placed on an ecosystem while maintaining its integrity and capacity to provide goods and services. • Cumulative effects of interventions over time and space should be assessed when considering ecosystem limits. • Our current understanding is insufficient to allow these
Development of scientific understanding of systems and the relationship between human actions and changes in other system components		
Assess the cumulative impacts of multiple human activities on marine ecosystems	UN	
Use integrated decision-making processes and management related to multiple activities and sectors		

		limits (thresholds) to be precisely defined; therefore a precautionary approach coupled with adaptive management is advised.
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6. EBM seeks to incorporate and reflect, to the extent it is relevant, expert knowledge including scientific, traditional and local knowledge.

Principles Reviewed	Source	Additional Context / Rationale
Decision-making must be integrated and science-based	BePOMAr	<ul style="list-style-type: none"> Information and perspectives of communities are important in designing and implementing management actions.
The application of the best available scientific and other knowledge to understand ecosystem interactions and manage human activities accordingly		
Integrated and multidisciplinary approach that takes into account the entire ecosystem, including humans	CBD	<ul style="list-style-type: none"> Different information sources can provide complementary perspectives. Scientific, traditional, and local knowledge need to be integrated to ensure more informed, flexible decision-making.
The ecosystem approach should consider all forms of relevant information, including scientific and indigenous and local knowledge, innovations and practices		
The ecosystem approach should involve all relevant sectors of society and scientific disciplines		
Be based on best available knowledge, including traditional, indigenous and scientific information and be adaptable to new knowledge and experience	UN	

7. EBM is inclusive and encourage participation at all stages by various levels of government, indigenous peoples, stakeholders (including the private sector) and other Arctic residents.

Principles Reviewed	Source	Additional Context / Rationale
Stakeholder and Arctic resident participation is a key element	BePOMAr	<ul style="list-style-type: none"> A multi-sector approach lies at the core of an EBM approach. Objectives for EBM in particular areas should be determined through negotiations and trade-offs among stakeholders having different interests, intentions, and relationships with the natural world. All relevant sectors of society need to have their interests equitably treated. EBM approaches should be delivered in a manner consistent with Aboriginal
The objectives of management of land, water and living resources are a matter of societal choices	CBD	
The ecosystem approach should involve all relevant sectors of society and scientific disciplines		
Natural resources are best managed within a management system that is based on a shared vision and a set of objectives developed amongst stakeholders.	WWF	
Be inclusive, with stakeholder and local communities' participation in planning, implementation and management	UN	
Take into account ecological, social, cultural, economic, legal and technical perspectives		
Strive to balance diverse societal objectives		

		<p>and treaty rights.</p> <ul style="list-style-type: none"> It is important to provide for public participation that enables community voices to be heard.
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8. Transboundary perspectives and partnerships can contribute significantly to the success of EBM efforts.

Principles Reviewed	Source	Additional Context / Rationale
Area-based approaches and transboundary perspectives are necessary	BePOMAr	<ul style="list-style-type: none"> It is important to consider linkages within and between both Arctic and non-Arctic ecosystems in applying EBM. Increased international cooperation in shared ecosystems through regional management bodies, new collaborative efforts can help support implementation of effective EBM approaches.
Transboundary arrangements for resolution and handling of transboundary ecosystems and issues		
Ecosystem managers should consider the effects (actual or potential) of their activities on adjacent and other ecosystems	CBD	
Take into account factors originating outside the boundaries of the defined management area that may influence marine ecosystems in the management area	UN	
Strengthened and improved coordination and cooperation within, and, in accordance with international law, between and among States, intergovernmental organizations, regional scientific research and advisory organizations and management bodies		
Improved cooperation and collaboration among international organizations, including better linkages between regional fisheries management and marine-related organizations		

9. Recognizing that ecosystems and human activities are dynamic, that the Arctic is undergoing rapid changes, and that our understanding of these systems is constantly evolving, successful EBM efforts are flexible and adaptive.

Principles Reviewed	Source	Additional Context / Rationale
Flexible application of effective ecosystem based management	BePOMAr	<ul style="list-style-type: none"> Ecosystems (including species composition and population abundance) change, both naturally and as a result of human activities. Furthermore, our understanding of these systems and their
Decision making must be integrated and science based		
Adaptive management is critical		
An integrated and multidisciplinary approach to management that takes into account the entire ecosystem, including humans		
Management must recognize that change is inevitable	CBD	
Be based on best available knowledge, including	UN	

traditional, indigenous and scientific information and be adaptable to new knowledge and experience;		interactions is constantly evolving. • Adaptive and flexible management must therefore be used to anticipate and respond to such changes.
Ecosystems are dynamic, sustainability does not imply maintenance of the status quo	ESA	
Current models and paradigms of ecosystem function are provisional and subject to change		
Ecosystems are dynamic; their attributes and boundaries are constantly changing and consequently, interactions with human uses also are dynamic	WWF	
Successful management is adaptive and based on scientific knowledge, continual learning and embedded monitoring processes		

ANNEX 1: Glossary of Relevant Terms

This glossary is intended to provide definitions for some of the technical terms used in this document. It is not intended to serve as a comprehensive or definitive listing of terms relevant to EBM and its use within the Arctic Council.

Biodiversity	the variability among living organisms from all sources including, inter alia, terrestrial, marine and other aquatic ecosystems and the ecological complexes of which they are part; this includes diversity within species, between species and of ecosystems (from <i>Article 2, Convention on Biological Diversity</i>)
Cumulative impact:	the impact on the environment which results from the incremental impact of an action when added to other past, present, and reasonably foreseeable future actions ... cumulative impacts can result from individually minor but collectively significant actions taking place over a period of time. (adapted from <i>US National Environmental Policy Act</i>)
Ecosystem:	a dynamic complex of plant, animal and micro-organism communities and their non-living environment interacting as a functional unit (<i>Article 2 of the CBD</i>)
Ecosystem services:	Ecological or ecosystem processes or functions or products which have value to individuals or to society (<i>Glossary of technical terms generated by the CBD</i>)
Ecosystem-based Management:	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 ecosystems thereby achieving sustainable use of ecosystem goods and services and maintenance of ecosystem integrity (<i>WSSD</i>)
Interdisciplinary:	involving two or more academic disciplines (<i>Collins English Dictionary</i>)
Monitoring:	the process of determining status and tracking changes in living organisms and the ecological complexes of which they are a part (<i>Canadian Biodiversity: Ecosystem Status and Trends 2010</i>)
Resilience:	The ability of an ecosystem to maintain, recover or bounce back its diversity, integrity and ecological

processes following stress or disturbance (*Glossary of technical terms generated by the CBD*)

Vulnerable ecosystem:

An area under significant existing or anticipated environmental pressure. (*Adapted from: Implementing an Ecosystem Approach in Environment Canada, internal document, Environment Canada 2009*)

ANNEX 2: Definitions of Ecosystem Based Management

For the purpose of the OSPAR Convention, the ecosystem approach is defined as “the comprehensive integrated management of human activities based on the 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 marine ecosystems, thereby achieving sustainable use of ecosystem goods and services and maintenance of ecosystem integrity”.

— *OSPAR Commission for protecting and conserving the North-East Atlantic and its resources*

"EBM looks at all the links among living and nonliving resources, rather than considering single issues in isolation...Instead of developing a management plan for one issue...EBM focuses on the multiple activities occurring within specific areas that are defined by ecosystem rather than political boundaries."

— *U.S. Commission on Ocean Policy*

“In ecosystem-based management, the associated human population and economic/social systems are seen as integral parts of the ecosystem. Most importantly, ecosystem-based management is concerned with the processes of change within living systems and sustaining the goods and services that healthy ecosystems produce. Ecosystem-based management is therefore designed and executed as an adaptive, learning-based process that applies the principles of the scientific method to the processes of management.”

— *United Nations Environment Programme (UNEP)*

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

— *Convention on Biological Diversity*

“Ecosystem-based management is a long-term, integrated approach that recognizes humans are part of and have significant influences on their environments. It is a shift away from conventional management paradigms that are often jurisdictional, short term and consider humans to be independent of nature. An ecosystem-based management plan includes adaptive management strategies and trade-offs, whether between ecosystem services, management strategies or other components of the plan, that are made as explicitly as possible.” (*Seaweb*, see: <http://www.seaweb.org/resources/ebm/whatissebm.php>)

Arctic Council uses of EBM

The Nuuk Declaration decision to establish an expert group on Arctic EBM was not the first time the importance of an ecosystem approach was highlighted by the Arctic Council. The Arctic Council has promoted EBM for a number of years, including endorsing its application to the marine environment in the 2004 Reykjavik Declaration and through a 2009 report to the Senior Arctic Officials (SAOs) elaborating on the benefits of EBM. The 2009 report stated:

“Integrated ecosystem-based management can provide a framework for the utilization of natural resources and goods, while at the same time maintaining the structure, functioning and productivity of the area. Many ecosystems and environmental impacts of human activities extend across state boundaries and it is also important to consider both offshore and onshore

as well as atmospheric impacts of activities. The exchange and building of knowledge, with the aim of developing a common approach to ecosystem-based management of natural resources of the Arctic, is therefore a natural priority for the Arctic Council.”

Several Arctic Council working groups actively consider EBM in their work. For example, the Protection of the Arctic Marine Environment working group (PAME) has an ongoing project on advancing an ecosystem approach in the Arctic Ocean and has identified Large Marine Areas to facilitate cooperative research and decision-making. Similarly, the Conservation of Arctic Flora and Fauna (CAFF) working group uses EBM as a guiding principle for its work. This is reflected in the work of the Circumpolar Biodiversity Monitoring Program (CBMP), the ongoing Arctic Biodiversity Assessment (ABA), and other CAFF projects. The Arctic Monitoring and Assessment Program (AMAP) working group is also using EBM in its proposal for an Arctic Change Assessment (ACA).

Arctic Council definitions of EBM:

In promoting an ecosystem approach, some Arctic Council working groups have developed definitions for EBM.

PAME through the 2004 Arctic Marine Strategic Plan defines ecosystem-based management as an approach that “requires that development activities be coordinated in a way that minimizes their impact on the environment and integrates thinking across environmental, socio-economic, political and sectoral realms.”

According to CAFF’s Strategic Plan for the Conservation of Arctic Biological Diversity, one of the guiding principles of CAFF is, “The use of a broad, ecosystem approach to conservation and management”. This principle states: “Conservation goals cannot be achieved solely on a species-by-species basis, or by protecting small areas. The health of the Arctic environment depends on conserving the full range of flora, fauna and habitats. This can only be done effectively if we recognize that activities affecting one component or area of the ecosystem will in turn affect the rest of the ecosystem.”

CAFF’s CBMP also elaborates on an ecosystem approach in its implementation plan, which highlights the following elements:

Integrated Ecosystem-based Approach to Monitoring:

The ecosystem-based approach to monitoring integrates information on land, water, and living resources and lends itself to monitoring many aspects of an ecosystem in a geographic region. In the context of Arctic biodiversity, the ecosystem-based approach implies the following conditions:

- Recognition that monitoring all elements of ecosystems—including species, habitats, ecosystem structure, processes, functions, and stressors to the ecosystems — is necessary to gain a meaningful picture of what is happening to biodiversity;
- A focus on trends, including recognition of the dynamic nature of Arctic ecosystems and the importance of identifying change that is outside the realm of natural variability;
- Recognition of the interplay between terrestrial, freshwater, and marine systems and the way it shapes Arctic ecology and the goods and services that Arctic biodiversity provides;

- Recognition of the dependence of Arctic biodiversity on conditions outside the Arctic;
- Recognition of humans and their cultural diversity as an integral component of many ecosystems; and,
- Monitoring the interactions between people and biodiversity, such as sustainable use and the ability of biodiversity to provide essential goods.

The ecosystem-based approach to monitoring considers the integrity of entire ecosystems and their interaction with other ecosystems. Although the complexity and data/analysis requirements far exceed those of the species approach, the rewards of the ecosystem-based approach are significant. It identifies important relationships, providing a bridge between ecosystems, habitats, and species and the impacts of stressors on ecological functions. The resulting information contributes directly to adaptive management, thereby allowing for effective conservation, mitigation, and adaptation actions appropriate to the Arctic.

ANNEX 3: Principles and Core / Consensual Elements of Ecosystem Based Management

i) Best Practices in Ecosystem-Based Oceans Management in the Arctic (BePOMAr)

The conclusion section of the BePOMAr highlights the importance of the following considerations:

- Flexible application of effective ecosystem based management
- Decision making must be integrated and science based
- National commitment is required for effective management
- Area based approaches and transboundary perspectives are necessary
- Stakeholder and Arctic resident participation is a key element
- Adaptive management is critical

The following “core elements” of EBM are noted in the body of the document:

- The geographical scope of ecosystems defined by ecological criteria.
- the development of scientific understanding of systems and of the relationship between human actions and changes in other system components.
- the application of the best available scientific and other knowledge to understand ecosystem interactions and manage human activities accordingly.
- an integrated and multidisciplinary approach to management that takes into account the entire ecosystem, including humans.
- area-based management and use of scientific and other information on ecosystem changes to continually adapt management of human activities.
- the assessment of cumulative impacts of different sectors on the eco-system, instead of single species, sectoral approaches.
- a comprehensive framework with explicit conservation standards, targets and indicators in order to facilitate responses to changes in the eco-system
- transboundary arrangements for resolution and handling of transboundary ecosystems and issues.

ii) Convention on Biological Diversity

Principle 1: The objectives of management of land, water and living resources are a matter of societal choices.

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:

- a. Reduce those market distortions that adversely affect biological diversity;
- b. Align incentives to promote biodiversity conservation and sustainable use;
- c. 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: Ecosystem 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 the 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.

iii) Excerpt from the Report on the work of the United Nations Open-ended Informal Consultative Process on Oceans and the Law of the Sea at its seventh meeting

Agreed consensual elements

6. While there is no universally agreed definition of an ecosystem approach, which is interpreted differently in different contexts, it was proposed that the General Assembly, invite States to consider that an ecosystem approach should, inter alia:

- (a) Emphasize conservation of ecosystem structures and their functioning and key processes in order to maintain ecosystem goods and services;
- (b) Be applied within geographically specific areas based on ecological criteria;
- (c) Emphasize the interactions between human activities and the ecosystem and among the components of the ecosystem and among ecosystems;
- (d) Take into account factors originating outside the boundaries of the defined management area that may influence marine ecosystems in the management area;
- (e) Strive to balance diverse societal objectives;

- (f) Be inclusive, with stakeholder and local communities' participation in planning, implementation and management;
- (g) Be based on best available knowledge, including traditional, indigenous and scientific information and be adaptable to new knowledge and experience;
- (h) Assess risks and apply the precautionary approach;
- (i) Use integrated decision-making processes and management related to multiple activities and sectors;
- (j) Seek to restore degraded marine ecosystems where possible;
- (k) Assess the cumulative impacts of multiple human activities on marine ecosystems;
- (l) Take into account ecological, social, cultural, economic, legal and technical perspectives;
- (m) Seek the appropriate balance between, and integration of, conservation and sustainable use of marine biological diversity; and
- (n) Seek to minimize adverse impacts of human activities on marine ecosystems and biodiversity, in particular rare and fragile marine ecosystems.

7. It was suggested that the General Assembly propose that implementation of an ecosystem approach could be achieved through, inter alia:

- (a) Its inclusion in the development of national policies and plans;
- (b) Encouraging and supporting marine scientific research, in areas within and beyond national jurisdiction, in accordance with international law;
- (c) Understanding, through increased research, the impacts of changing climate on the health of marine ecosystems, and developing management strategies to maintain and improve the natural resilience of marine ecosystems to climate variations;
- (d) Understanding, through increased research, the impacts of underwater noise on marine ecosystems and taking into account those impacts;
- (e) Where appropriate, strengthening regional fisheries management organizations, adapting their mandates and modernizing their operations in accordance with international law;
- (f) Strengthened and improved coordination and cooperation within, and, in accordance with international law, between and among States, intergovernmental organizations, regional scientific research and advisory organizations and management bodies;
- (g) Effective and full implementation of the mandate of existing multilateral/ organizations, including those established under UNCLOS;
- (h) Application of the Rio Principles and the use of a broad range of management tools for the conservation and sustainable use of marine biodiversity, including sector specific and integrated

area-based management tools on a case-by case basis, based on the best available scientific advice and the application of the precautionary approach and consistent with international law;

(i) Identifying and engaging stakeholders to promote cooperation;

(j) Sectoral approaches and integrated management and planning on a variety of levels, including across boundaries, in accordance with international law;

(k) Effective integrated management across sectors;

(l) Advancement of the Plan of Implementation of the World Summit on Sustainable Development, including, inter alia, the elimination of destructive fishing practices, the establishment of marine-protected areas consistent with international law and based on scientific information, including representative networks by 2012 and time/area closures for the protection of nursery grounds and periods, proper coastal land use and watershed planning and the integration of marine and coastal areas management into key sectors; and

(m) Conducting, in accordance with national legislation and international law, assessments in relation to marine activities likely to have a significant impact on the environment.

8. It was proposed that the General Assembly invite States to consider that improved application of an ecosystem approach will require, inter alia:

(a) Capacity-building through technology, knowledge and skills transfer, particularly to developing countries, including small island developing States and coastal African States, as well as exchange of information, data and lessons learned, and capacity-building in support of science, information management and exchange, monitoring, control and surveillance, assessment and reporting as well as through public outreach and education;

(b) Steps in the development of an ecosystem approach include identification of ecologically based management areas; assessment of ecosystem health; development of indicators; identification of the key environmental limits; monitoring, control, surveillance and reporting and adjustment of management measures, as appropriate;

(c) Monitoring the state of ecosystems supported by the use of data collection systems, analysis, and modelling to inform future management approaches;

(d) Addressing activities and pressures that lead to adverse impacts on marine ecosystems, including land-based pollution, overfishing, illegal, unreported and unregulated fishing, by-catch of threatened species, sea-based pollution, dumping, physical destruction and degradation of habitats, and introduction of invasive species;

(e) An iterative development of an ecosystem approach with an emphasis on integrated management of human uses of the oceans, which could be achieved, inter alia, through the strengthening of cooperation and collaboration among existing instruments, bodies and scientific research and advisory organizations;

(f) Targeted action to address root causes of activities that can undermine the conservation and integrity of marine ecosystems;

(g) Filling critical knowledge gaps and addressing uncertainty;

- (h) Developing, raising and sustaining public awareness and institutional and political will;
- (i) Improved cooperation and collaboration among international organizations, including better linkages between regional fisheries management and marine-related organizations and by encouraging all States whose vessels participate in a fishery regulated by a regional fisheries management organization or arrangement to cooperate by becoming members of such organization or participants in such arrangement, and, to this end, establishing mechanisms to promote non-member participation;
- (j) Developing mechanisms to monitor and review ecosystem health and management effectiveness;
- (k) Dissemination of information to the public on activities that negatively affect ecosystems and the ocean environment and their associated products;
- (l) Improving, as appropriate, legal and policy frameworks to support and facilitate the application of the precautionary approach and ecosystem approaches; and
- (m) Compilation of scientific and ecological criteria, inter alia, for the identification of marine-protected areas.

9. It is suggested that the General Assembly take note of the possible options, approaches and timely follow-up process discussed by the Ad Hoc Open-ended Informal Working Group to study issues relating to the conservation and sustainable use of marine biological diversity in areas beyond national jurisdiction.

iv) WWF principles for ecosystem based management

a. Maintaining the natural structure and function of ecosystems, including the biodiversity and productivity of natural systems and identified important species, is the focus for management.

b. Human use and values of ecosystems are central to establishing objectives for use and management of natural resources.

c. Ecosystems are dynamic; their attributes and boundaries are constantly changing and consequently, interactions with human uses also are dynamic.

d. Natural resources are best managed within a management system that is based on a shared vision and a set of objectives developed amongst stakeholders.

e. Successful management is adaptive and based on scientific knowledge, continual learning and embedded monitoring processes.

v) Ecological Society of America

- Ecosystem management assumes intergenerational sustainability as a precondition for management
- Goals must be explicitly stated in terms of specific desired future behaviors/conditions

- Ecosystem management is based on sound ecological principles and emphasizes the role of processes and interactions at all levels of organization
- Biological diversity, structural complexity, and connectedness of ecosystems are important for ecosystem resistance and resilience
- Ecosystems are dynamic, sustainability does not imply maintenance of the status quo
- Processes operate over a wide range of spatial and temporal scales; there is no single appropriate scale or time frame for management
- Humans are an integral ecosystem component
- Current models and paradigms of ecosystem function are provisional and subject to change