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Can Any and All Marine Activities Be Compatible with EBM, or Are There Limits? Experts Respond ^[2]

When MEAM published an article four years ago that complimented Namibia on its marine EBM efforts - including new protected areas, a regional ecosystem management project, and an emerging coastal policy ([MEAM 3:1](#) ^[3]) - we received a letter from a frustrated reader. "How can you suggest Namibia is practicing ecosystem-based management when that country conducts one of the largest seal hunts in the world?" the person wrote.

It was a fair question. Namibia's seal hunt, or cull, involves the clubbing of 80,000 pups and 6000 bull seals each year, with the fur, meat, and other body parts sold to an international dealer. It is decried by animal rights organizations as brutal, and the EU banned the import of seal products in 2009, partly in response to Namibia's hunt. However, the Namibian government views the cull as sustainable (the nation's fur seal population is 1.2 million seals) and a prudent ecosystem-based measure. That is, the government blames the seals for competing with Namibian fishermen for fish; so by reducing the seal population, the competition for fish is lessened and the ecosystem is in better balance, in the government's view.

This raises a point that is central to discussions of EBM. Namely, can any and all human activities be considered compatible with EBM as long as they are done in an integrated, sustainable way? Or are some activities simply incompatible with the concept of ecosystem-based management?

The question applies to more than seal hunts. As industry continues to develop new uses for and access to the resources of the ocean, resource managers must determine how those new (often extractive) uses fit within EBM - if they do. Mining of seafloor minerals in the deep sea is one example of such a use. So is exploration and drilling for oil in previously ice-covered Arctic marine ecosystems.

MEAM asked three people for their views on the compatibility or incompatibility of various human activities with marine EBM:

Sidney Holt - fisheries scientist based in Italy, who was active for many years in FAO and the International Whaling Commission and is now involved in the revision of the European Union's Common Fisheries Policy;

Alf Håkon Hoel - research director for the Institute of Marine Research (Tromsø, Norway) and editor of *Best Practices in Ecosystems Based Oceans Management in the Arctic* (www.sdwg.org/media.php?mid=1017 ^[4]); and

Steven Yaffee - professor of natural resource policy at the University of Michigan, and co-developer of the "Marine Ecosystem-Based Management in Practice" website (www.snre.umich.edu/ecomgt/mebm ^[5]).

Below are our questions, citing real-world examples, followed by the experts' responses. The responses indicate the range of definitions of EBM. Some also bring out the element of personal and societal values, which can be embedded in the choice of definition.

Question 1: There are several resource management programs worldwide - including in Namibia, Canada, the US, and elsewhere - in which marine mammal populations are being culled for the express purpose of allowing more fish to be caught by fishermen. In your opinion, is marine mammal culling compatible with the concept of ecosystem-based management?

Sidney Holt: Not that I am aware. This does not mean that such culling could not be compatible in principle, and under some rigorous conditions. But I know of no practical real examples. I understand your use of the word "culling" to mean something akin to "pruning" a fruit tree or "cleaning up" a piece of woodland - done for their own sakes or to enhance human sustainable (and so limited) use. However, all marine mammal culling I have experienced, in reality or as proposals, has been directed either to justify exploitation without much concern for sustainable use (except to pay lip service to it), or to claim that the cull is "saving the mammals" food, especially fishes. In the case of whaling by Japan, this has led to the Japanese authorities publishing the spurious results of much lethal "research", and absurdities such as labeling all the krill, amphipods and copepods the whales eat as "fish".

Alf Håkon Hoel: There is no culling of marine mammals in Norway, but there is a commercial hunt [of seals and whales]. Commercial hunting is a better option, as it provides healthy and tasty food, which is an important ecosystem service to humans.

Steven Yaffee: At one level, ecosystem-based management is a process of analysis and collaborative decision-making that does not absolutely preclude any specific use. Hence, there may be scenarios where a science-based and interest-inclusive process of assessment may find ways that management of a marine mammal population may be possible and socially acceptable. In the extreme case of clubbing seals, however, ethical issues are raised for which an EBM process can only provide a platform for discussion of what is ultimately a values-based choice. Depending on the situation, the process may or may not be able to reconcile competing perspectives.

As a process, EBM also elevates the importance of maintaining or restoring ecosystem health or integrity. In this light, managing marine mammal populations to promote fisheries production may be theoretically possible but practically very unlikely, even leaving aside ethical issues. It is hard to find many places where marine mammal populations are overstocked, and given dynamic predator-prey relationships and the longevity of marine mammals, I find it hard to imagine the circumstances under which a culling program could be justified under an EBM regime.

Question 2: In 2012, New Caledonia indicated its intent to designate a 1-million km², multi-use MPA and said that it would potentially

permit the "sustainable" mining of minerals within that MPA (mpanews.org/MPA128.htm ^[6]). Other nations have also indicated their intent to start seabed mining. Are there scenarios in which deep seabed mining of minerals could be considered compatible with EBM?

Holt: Mining of some minerals that lie on the seabed, such as so-called manganese nodules being "scraped up", would perhaps not be too disruptive and polluting. However, methane hydrates (now being exploited, still on a small scale, by Japanese operators for fuel) are extremely dangerous to the ocean and indeed the planet. Inevitable "spills" of methane will add to global warming problems arising from the potent greenhouse gas methane itself and the additional carbon dioxide generated by burning it.

Hoel: It depends. The critical issue is whether the activity can take place in areas where ecosystems do not have a high degree of vulnerability and can be carried out without emissions of toxic substances in the marine environment.

Yaffee: There are scenarios where deep seabed mining could be consistent with EBM. However, those scenarios are unlikely in an established marine protected area since most reserves have been established due to conditions or resources that required avoidance of such disruptions.

The seabed mining scenario, in particular, demonstrates how context- and place-specific the answers to your questions would be, since there are places where well-managed mining is possible. At its core, EBM is a process that involves engaging science and scientists, managers and management choices, and affected and concerned interests in a process that incorporates a rich understanding of ecosystems and ecosystem processes and the implications of alternative patterns of use. The objective of EBM is not to preclude use but rather to assure that key ecosystem processes and components are maintained or restored while allowing appropriate levels of use. Without achieving that bottom line, there is no ability to sustain use.

Question 3: Several nations are moving forward on exploring and drilling for petroleum in formerly ice-bound Arctic waters. Are there scenarios in which oil exploration and drilling in Arctic waters could be considered compatible with EBM?

Holt: Firstly, "ecosystem-based management", while being a very ambiguous term, is at least always considered to be about sustainability. Oil exploration and drilling are, by definition, about unsustainable use: the oil is a nonrenewable resource.

The mineral resources sought are not, I consider, actually in the marine ecosystems. It is the drilling and extraction process, and movement of the product and the wastes from the operations, that are within the marine environment and that affect that environment. Without any doubt those processes damage or seriously risk damage to the living ecosystems. Hence these processes are incompatible with EBM. But much worse, the use to which the products are put, particularly their combustion, is contrary to the aims of EBM because the end products eventually enter the marine sphere and cause damaging acidification (highly corrosive to the most abundant planktonic animals - the shelled mollusk pteropods - that form the most important animal bases of the marine food networks) as well as other kinds of pollution. All experience so far tells us that this extraction and transport process is inevitably accompanied by high risk or unintended consequences - deleterious consequences without exception. The technological (and human error) problems are so high that it is unreasonable to assume that they can be reduced, by care or regulation, to low and negligible risk.

Hoel: Again, it depends. If operations can be carried out in areas with low levels of vulnerability and with low levels of risk, yes. EBM does not exclude commercial activities, but stipulates that it is carried out in ways that do not harm ecosystems.

Yaffee: The precautionary principle applied to an assessment of the risks of this activity makes it hard to imagine conditions where it may proceed while still maintaining ecosystem health. While one could argue that the adaptive management component of EBM might allow experimentation with various activities, those that would take place in systems with slow response and recovery are particularly questionable. In this case, drilling in the unforgiving waters of the Arctic is not likely to be an appropriate use given risks of long-impact spills and other less risky ways to secure energy.

For more information:

Sidney Holt, Paciano, Umbria, Italy. Email: sidneyholt@mac.com

Alf Håkon Hoel, Institute of Marine Research, Tromsø, Norway. Email: alf.haakon.hoel@imr.no

Steven Yaffee, University of Michigan, Ann Arbor, Michigan, US. Email: yaffee@umich.edu

BOX: Additional resources examining the ecosystem-based implications of various ocean uses

Arctic oil exploration/drilling

"Supplemental Draft Environmental Impact Statement for the Effects of Oil and Gas Activities in the Arctic Ocean"

Released by NOAA and US Bureau of Ocean Energy Management in March 2013. This document analyzes how potential offshore oil and gas activities in the Arctic could affect marine mammals, other resources, and Alaska Native communities. Open for public comment until 27 June 2013. www.nmfs.noaa.gov/pr/permits/eis/arctic.htm ^[7]

Deep sea mining

"International Workshop on Environmental Management Needs for Exploration and Exploitation of Deep Seabed Minerals"

Held in 2011 in Fiji, and organized by the International Seabed Authority and the Secretariat of the Pacific Community. www.isa.org.jm/en/scientific/workshops/2011 ^[8]

Seal culling to boost targeted fish populations

"2011-2015 Integrated Fisheries Management Plan for Atlantic Seals"

Released by Fisheries and Oceans Canada. Governs the hunt of seal populations in Atlantic Canada. www.dfo-mpo.gc.ca/fm-gp/seal-phoque/reports-rapports/mgtplan-planges20112015/mgtplan-planges20112015-eng.htm ^[9]

Open Letter: "Independent Marine Scientists Respond to Senate Fisheries Committee Report 'The Sustainable Management of Grey Seal Populations: A Path Toward the Recovery of Cod and Other Groundfish Stocks'"

Released by marine scientists at Dalhousie University in Atlantic Canada.

www.marketwire.com/press-release/independent-marine-scientists-respond-senate-fisheries-committee-report-the-sustainable-1722244.htm ^[10]

Tundi's Take: We must consider not only what we take out of the sea, but also what we put into it ^[11]

By Tundi Agardy, MEAM Contributing Editor. tundiagardy@earthlink.net

Honest dialogue about what are acceptable uses of the sea and coasts can only be good. It forces us to take stock of what we know, and likewise forces us - as users and as nations - to put our desires and needs on the table. While those desires and needs vary from sector to sector and from place to place, we all share a global ambition to use marine resources and space wisely so as not to risk ecological imbalance, economic and environmental vulnerability, and conflict.

But for far too long the focus has been on resource extraction - especially fisheries - while the myriad other ways we run those aforementioned risks are seemingly ignored.

Don't get me wrong. Excessive extraction of living and non-living resources from the sea has restructured marine ecosystems, caused declines in biodiversity and in much-

valued productivity, and exacted costs borne not by the extractive industries doing the taking but rather by the coastal communities living nearby, and the rest of us, too. I get it, and fully endorse the notion that creating no-take areas is a necessity if we are to practice effective EBM. And I even understand why campaigners have had to reduce the highly complex challenges of marine conservation down to a few simple rules, creating a storyline for the public that casts conservation as a struggle between "good" (non-extractive uses) and "evil" (extractive uses). In some popular storylines, we even posit the "supreme": no use, or what my Italian colleagues used to call "no go" - marine wilderness made pure by the absence of humans.

It is okay to be nature-centric. But it is not okay to be delusional. Fact is, there are no pristine wilderness areas anymore. Marine debris, chemical pollutants, alien species, and noise find their way to every corner of the ocean realm. These stressors are not trivial, especially when occurring cumulatively over time. What we put into the sea, through direct dumping, indirect operational discharge, run-off, and atmospheric loading, may have more profound effects on ecosystem function than what we take out. And when we couple these other impacts with those caused by extractive industries - like physical destruction caused by large scale fisheries, oil and gas, or seabed mining - we push these systems perilously close to collapse. We must think holistically, and address all uses and impacts systematically, if we are to avoid that.

We have created a paradox. On the one hand, we demonize extractive industries because they take too much resource out. On the other, we often avoid the difficulties inherent in dealing with extractive industries when practicing MSP or undertaking EBM: we let them opt out of the process if they want, or we avoid engaging them all together. We need a more mature approach - one that accepts humans as a part of natural ecosystems, considers all of the ways we impact the seas, allows for sustainable use wherever that is truly achievable, and harnesses the best available tools to help us decide which of all uses, and what levels of use, are acceptable where.

Notes & News: US ocean plan - Climate adaptation strategy - Global MPA coverage - Spatial conservation priorities - Blue carbon - ABNJ - Risk management and EBM - Triple-bottom-line outcomes - Marine ecosystem services ⁽¹²⁾

US releases implementation plan for ocean policy; emphasizes regional priorities in MSP

In April, the Obama Administration released its final plan to translate the US national ocean policy into specific actions. Together the actions involve:

- Supporting and promoting the ocean economy;
- Enhancing maritime safety and security;
- Improving coastal and coastal resilience;
- Supporting local and regional priorities; and
- Advancing marine science and information.

Each action identifies the responsible agencies and an expected timeframe for completion. The final plan incorporates public comments received on a draft that was released in early 2012 ([MEAM 5.4](#) ⁽¹³⁾), including specifying that regional stakeholders will determine the scope, scale, and content of collaborative marine spatial planning in their region. Marine spatial planning is a central component of the national ocean policy, and will be carried out on a phased basis across nine regional planning areas ([MEAM 4.1](#) ⁽¹⁴⁾). The planning process for the northeast region of the US is already underway (<https://www.openchannels.org/blog/scosgrove/new-england%E2%80%99s-regional-planning-body-making-progress> ⁽¹⁵⁾), ⁽¹⁵⁾

The implementation plan specifies that participation in the regional planning bodies is voluntary, and that such bodies will be established only in regions that want them. In cases in which a region does not establish a planning body, federal agencies "will collaborate to identify and address priority science, information, and ocean management issues and coordinate with non-federal partners and stakeholders as appropriate," according to the plan. Regional planning bodies are expected to develop marine plans by the end of 2017.

To learn more about the national ocean policy or read the implementation plan, go to www.whitehouse.gov/administration/eop/oceans/policy ⁽¹⁶⁾.

US releases national climate adaptation strategy

The Obama Administration has released a national strategy to help public and private decision-makers address the impacts that climate change is having on natural resources, ecosystem services, the economy and individuals. The "National Fish, Wildlife, and Plants Climate Adaptation Strategy" provides a roadmap of steps needed over the next five years to reduce an array of climate change impacts. These impacts include altered species distributions and migration patterns, the spread of wildlife diseases and invasive species, the inundation of coastal habitats with rising sea levels, and changing productivity of coastal waters. The strategy is available at www.wildlifeadaptationstrategy.gov ⁽¹⁷⁾.

Global MPA coverage: 10% target will be met, but more focus is needed on ecosystem services

A new review of global MPA coverage by The Nature Conservancy and the UNEP World Conservation Monitoring Centre estimates that if the current pace of MPA designations remains steady, the world may meet the overarching goal of protecting 10% of the oceans by 2020, set under the Convention on Biological Diversity. However, the authors caution that the true CBD goal is more complex, requiring effective coverage of biodiversity and of ecosystem services. Much of the recent growth in MPA coverage has been in very large remote tracts of ocean, sometimes excellent for biodiversity but not so good for defending or restoring the many local benefits that MPAs can provide to people. The authors also point out the danger of such targets, which can leave the remaining 90% of the ocean as an afterthought.

They recommend that all of the ocean, inside and outside of MPAs, should be managed more effectively with the sustainability of ecosystem services in mind. Mark Spalding of The Nature Conservancy is lead author of the review, which appears as a chapter in the *Ocean Yearbook 27*, released in April. (The chapter by itself is available at www.nature.org/ourscience/protecting-marine-spaces-global-targets-and-changing-approaches.pdf ⁽¹⁸⁾) Among the review's conclusions:

- More MPAs should be placed close to people, which is where threats to ecosystem services - and benefits to be gained from sustainably managed ecosystem services - are greatest; and
- There is a need for a more holistic vision of marine conservation with greater attention to wider-scale marine spatial planning into which MPAs are embedded.

Studies integrate multiple spatial conservation proposals to recommend priorities

The Mediterranean Sea and the Gulf of California have each been the subject of multiple marine planning exercises to recommend spatial conservation priorities, and each exercise's recommendations are unique in various ways. Two recent, independent studies - one for the Mediterranean and one for the Gulf of California - have focused on identifying convergence in the conservation priorities recommended for each region. The Mediterranean study, available for free in the journal PLOS ONE (www.plosone.org/article/info%3Adoi%2F10.1371%2Fjournal.pone.0059038 ⁽¹⁹⁾), reviews six existing and twelve proposed conservation initiatives in the region, highlighting gaps in conservation and management planning. Despite diversity among the 18 initiatives, the integrated analysis identified ten areas, encompassing 10% of the Mediterranean, that were consistently identified for conservation. An additional 10% of the sea was selected by at least five proposals. "These areas represent top priorities for immediate conservation action," concludes the study.

The Gulf of California study, which appears in the journal *Aquatic Conservation: Marine and Freshwater Ecosystems*

(<http://onlinelibrary.wiley.com/doi/10.1002/aqc.2334/abstract> ^[20]), analyzed seven marine conservation planning exercises in the region. Although this study found a degree of convergence among proposals, particularly in well-studied ecosystems, there was significant divergence among plans overall. Lead author Jorge Álvarez-Romero of the ARC Centre of Excellence for Coral Reef Studies at James Cook University (Australia) says the findings may surprise planners and marine conservationists in the region "who have a general perception that all plans point to the same priority areas," he says. "However, our findings are in agreement with previous studies in systematic conservation planning that have found that objectives, approach (e.g., avoiding threats vs. protecting threatened areas), and spatial scale of planning will have a strong influence on planning outputs."

Report provides baseline knowledge on existing blue carbon projects

A report from Conservation International catalogs 28 "blue carbon" projects from around the world, providing baseline knowledge on the involved organization(s), ecosystem type, activities/goals, results, timeline, and more. Blue carbon projects use marine and coastal ecosystems - specifically mangroves, tidal marshes, and seagrasses - to help mitigate global climate change through the storage and sequestration of carbon dioxide. The report "Profiles in Blue Carbon Field Work" is available on the Blue Carbon Initiative website at

<http://thebluecarboninitiative.org/wp-content/uploads/Profiles-in-Blue-Carbon-Field-Work.pdf> ^[21].

New publications on areas beyond national jurisdiction

A new report concludes that although various obligations exist to conduct environmental impact assessments for activities on the high seas, the obligations are mostly sector-based (deep sea fisheries, seabed mining) or region-specific. An international, trans-sector, and legally binding instrument to govern environmental impact assessments on high seas activities is therefore needed, states the report. Co-produced by the Institute for Sustainable Development and International Relations (a non-profit policy research institute in Paris) and the French Agency for Marine Protected Areas, the report recommends a set of minimum requirements under such an instrument, including creation of a global compliance committee. The report *Environmental impact assessments of areas beyond national jurisdiction* is available at www.iddri.org/Publications/Environmental-impact-assessments-in-areas-beyond-national-jurisdiction ^[22].

Meanwhile, a new study by an international team of researchers concludes that the current legal regime on the high seas in general is insufficient to maintain ecosystem health and productivity while also enabling sustainable use. Published in the journal *Conservation Letters*, the study concludes that a two-pronged approach is needed for future management of areas beyond national jurisdiction: an improved global legal regime that incorporates systematic planning, and the expansion of existing and new regional agreements and mandates. The abstract of the paper "Systematic conservation planning: a better recipe for managing the high seas for biodiversity conservation and sustainable use" is available at <http://onlinelibrary.wiley.com/doi/10.1111/conl.12010/abstract> ^[23].

Handbook applies risk management standards to marine and coastal EBM

The International Council for the Exploration of the Sea (ICES) has published a guide to managing marine and coastal ecosystem-based risk. The authors acknowledge that measures in environmental and spatial policy-making are rarely formulated specifically in terms of risk management. However, they add, elements of risk assessment underlie many marine and coastal policies, such as avoiding the risk of ship accidents and oil spills. The handbook applies the existing risk management framework of the ISO (the International Organization for Standardization) to concepts of environmental assessment, integrated coastal zone management, and marine spatial planning. The *Marine and coastal ecosystem-based risk management handbook* is at <http://ices.dk/news-and-events/news-archive/news/Pages/Publication-of-ICES-CRR317-on-Marine-and-coastal-ecosystem-based-risk-management.aspx> ^[24].

Study examines balance of conservation, social equity, and cost-effectiveness

A study in the Proceedings of the National Academy of Sciences examines the achievability of "triple-bottom-line outcomes" in marine resource management and conservation - i.e., where (a) conservation outcomes and (b) equity in social outcomes are both maximized, while (c) overall costs are minimized. Equity in the study was defined by distribution of costs and access to resources. Focusing on three cases that each involved the planning of MPAs (in California, Indonesia, and the greater Coral Triangle region), the study found that as conservation outcomes were improved (typically from limiting fishers' allowable catches or access to certain areas), equity declined, assuming a level budget. However, if the budget was increased, equity and conservation could both be achieved. The study "Achieving the triple bottom line in the face of inherent trade-offs among social equity, economic return, and conservation" is at www.pnas.org/content/110/15/6229.full.pdf+html ^[25].

Newsletter available on marine ecosystem services

The Marine Ecosystem Services Partnership (MESP) - a virtual center for information and communication on the human uses of marine ecosystem services worldwide - has launched a newsletter focusing on marine ecosystem service news, events, and publications. MESP aims to connect practitioners, economists, and policy-makers to raise the profile of ecosystem services and ease access to valuation data. For more information on MESP or to subscribe to the newsletter, go to www.marineecosystems-services.org ^[26].

The EBM Toolbox: So many tools! How do I choose? ^[27]

Editor's note: The goal of The EBM Toolbox is to promote awareness of tools for facilitating EBM. It is brought to you by the EBM Tools Network, an alliance of tool users, developers, and training providers.

By Sarah Carr

There are several software- and web-based tools available to help coastal planners anticipate the impacts of climate change and decide how best to adapt to those impacts. In the guide *Tools for Coastal Climate Adaptation Planning* just released by the EBM Tools Network, we provide a systematic approach for selecting the best tool for your needs among the myriad available. We suggest:

1. **Characterize your planning questions.** When selecting a tool, start by considering the goals of your planning process. During the scoping phase, you should have determined the information you need for planning and specific planning questions you need to answer. Tools should help provide this information and answer these questions.
2. **Identify the tool functions you need.** Figure out the general functions you want the tool to perform and where in the planning process you will use the tool.
3. **Research available tools.** Read about available tools (www.ebmtoolsdatabase.org ^[28] and www.csc.noaa.gov/digitalcoast/tools ^[29] are good resources) to see if any tools seem to provide the functionality you need and outputs that help address your planning questions.
4. **Assess the data and topical expertise you need.** Once you have identified a tool that may suit your needs, determine the data inputs, information, and topical expertise you will need to use it.
5. **Assess the capacity you have available to use the tool.** In addition to considering the availability of data, determine if you have or can get the human and technical resources you need to use the tool.

For more information on these steps, see *Tools for Coastal Climate Adaptation Planning* guide at www.natureserve.org/climatetoolsguide ^[30].

Sarah Carr is coordinator for the EBM Tools Network. Learn more about EBM tools and the EBM Tools Network at www.ebmtools.org ^[31].

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- [5] <http://webservices.itcs.umich.edu/drupal/mebm/>
- [6] <https://mpanews.openchannels.org/mpanews/issue/september-october-2012-142>
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- [24] <http://ices.dk/news-and-events/news-archive/news/Pages/Publication-of-ICES-CRR317-on-Marine-and-coastal-ecosystem-based-risk-management.aspx>
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