THE SKIMMER ON MARINE ECOSYSTEMS AND MANAGEMENT

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Issue PDF archive:

Check out our new Tools page! [1]

MEAM has pulled together recent journal articles, reports, MEAM articles, and other resources that provide information about a range of tools for common marine management and conservation tasks. We hope this page will be useful for practitioners getting started with tools research.

Check out the new Tools page [2].

If you know of additional resources that we could add or have feedback on the new Tools page, please contact us at meam@openchannels.org.

And many thanks to the EBM Tools Network members who have already provided information for this project!

Go to the new Tools page [2].

Resources to add? Improvements to suggest? Other feedback? Please contact us at meam@openchannels.org!

Estimating the vulnerability of ocean planning and blue economy to climate change [3]

Climate-related drivers of change – such as ocean warming, acidification, and deoxygenation – will alter ocean conditions and lead to changes in marine ecosystem structure and functioning, as well as the redistribution of the services that the oceans provide (see Figure 1). As a consequence, human uses that rely on these services – fisheries, aquaculture, and tourism for example – will also undergo spatial and temporal changes at multiple scales. These changes will include local increases and decreases in intensity of uses and relocation of uses. Marine spatial planning (MSP) informs the distribution of ocean uses in space and time, and it will undoubtedly be affected by climate change at all scales ranging from global to local.

MEAM discussed this with Catarina Frazão Santos, a research scientist with the Marine and Environmental Sciences Centre at the University of Lisbon. She is currently leading the research project OCEANPLAN to understand how marine spatial planning may be affected by and adapt to global climate change. She can be contacted at cfsantos@fc.ul.pt.

MEAM: Can you describe a few examples of how climate change can influence the distribution of ocean uses?

Frazão Santos: One example of how climate change is changing the distribution of ocean uses is the Arctic [4]. The reduction of sea ice cover in the Arctic Ocean is opening up new areas for potential economic exploitation. New shipping routes (e.g., the Northern Sea Route), hydrocarbon exploitation, commercial fishing, and aquaculture are among the ocean uses that will become possible in previously inaccessible and unexploited areas. Competition for this new ocean space can lead to increased conflict among blue economy-related sectors. In addition, the occurrence of ocean uses at new locations may have significant negative effects on key species and habitats as well as the human communities that rely on them.

It is important to keep in mind, however, that the effects of climate change on MSP will vary regionally because some ocean uses are more sensitive to climate change-related effects than others and different ocean uses have different socioeconomic importance across nations and regions.

MEAM: How can we assess the vulnerability of ocean planning processes to climate change?

Frazão Santos: We developed an index – the Ocean Planning Vulnerability Index – to assess this. The index uses the combined vulnerability to climate change of seven main ocean uses –fisheries, marine conservation, aquaculture, marine and coastal tourism, shipping, renewable energy, and seabed mining – as a proxy for MSP vulnerability. Vulnerability is characterized in the same way it is for the IPCC model – that is, as a function of a system's exposure, sensitivity, and adaptive capacity.

For *exposure* (i.e., what can be affected by climate change, the presence of goods and services), we consider the intensity and importance of the seven main ocean uses for a country. For *sensitivity* (i.e., how much can be affected by climate change or impact level), we consider how much the main drivers of ocean change (e.g., ocean warming, acidification, and deoxygenation) impact each ocean use [5]. For *adaptive capacity* (i.e., the ability to adjust and respond), we consider variables related to a country's capacity to adapt to climate change – assets, flexibility, organization, learning, and agency [6]. We integrate variables from each of the three dimensions of vulnerability (exposure, sensitivity, and adaptive capacity) into our index to get our preliminary MSP vulnerability values.

MEAM: Where has the index been applied so far, and what have you found?

Frazão Santos: We applied the index to 24 European coastal states (23 EU member states and Norway). The results are still preliminary (see Figure 2), but it is interesting to see that vulnerability varied significantly according to how we considered exposure. For vulnerability based on intensity (presence) of ocean uses, most vulnerable countries were located in Southern and Western Europe (e.g., Spain, Italy, France, and the UK). In contrast, vulnerability based on the importance (a country's dependence) on ocean uses, the most vulnerable countries were in Northern Europe and the eastern Mediterranean (e.g., Greece, Cyprus, and Norway). We also noticed that results were predominantly explained by variations in exposure because adaptive capacity did not vary considerably among European countries which generally have a high level of human development and we used global sensitivity. We also looked for variations between the vulnerability of blue economy sectors (all sectors except marine conservation) and the vulnerability of all ocean uses but did not find significant differences. I would stress, though, that these are only preliminary results. We will be applying the index to a variety of other case studies next year, as part of the new research project OCEANPLAN[7] that we are launching.

MEAM: How can MSP processes plan for climate change impacts?

Frazão Santos: Planning for a changing ocean will require increasingly flexible and adaptive MSP approaches, as well as the proper recognition of climate change as a real (and increasing) challenge. MSP will not be able to anticipate every potential future climate-related scenario and plan for all potential cases because this would be a massive use of resources with no guarantee of success. Instead, MSP must have the mechanisms to adapt to an uncertain and dynamic future. There are a number of operational approaches that can be incorporated into MSP to foster this flexibility and increase adaptive capacity. These approaches include adaptive management, dynamic ocean management[8], dynamic ocean zoning, anticipatory zoning, and just-in-time planning. A key challenge, however, will be finding the right balance between legal predictability and stability for ocean users with flexibility. And since management needs and contexts vary from place to place, a one-size-fits-all solution will almost never be appropriate.

Latest News and Resources for Ocean Planners and Managers [9]

- World on track to reach 1.5°C warming by 2030-2052[10]
- Morocco and Gambia only countries meeting Paris climate goals[11]
- Oceans may be retaining more heat than previously estimated[12]
- Study assesses potential for ocean-based measures to counter climate change[13](policy brief also available[14])
- European Parliament approves ban on single-use plastics[15]
- Plastic creating new habitats and promoting invasibility of the deep sea[16]
- Guidance for addressing land-sea interactions in MSP available[17]
- New policy brief on implementing ecosystem-based approach in MSP available[18]
- New tool provides free access to management-relevant ocean data[19]
- Report compares costs and capabilities of marine monitoring techniques[20]
- New database documents effectiveness of green infrastructure[21]
- Materials for integrated coastal management training course available[22]
- User guide created for EU MSP Platform[23]

Other items that may be of interest:

- Electronic tags could help prevent ghost fishing[24]
- Commercial fishing banned across much of Arctic Ocean[25]
- The "Blob" marine heatwave seems to be making a comeback in the northeast Pacific Ocean[26]
- How a small slice of a natural disaster turned into an ecological boon off the coast of Long Island, New York[27]
- New website provides summaries of new conservation psychology research[28]
- Article provides advice for scientists giving media interviews[29]

EBM Toolbox: Learning from others: The new global conservation planning database [30]

Creating a new marine management or conservation plan? You can learn what others have done in the past – build on their research and experiences and avoid making the same mistakes – using the new Conservation Planning Database[31]. The database has just been launched with 163 peer-reviewed papers on 155 marine systematic conservation planning exercises worldwide. The database can help planners find relevant conservation plans from all over the world including their local area, help scientists study trends in conservation planning, and help donors and NGOs identify regions where little conservation planning has been done.

Learning from the database

According to lead database author Jorge Álvarez-Romero, a research fellow at the ARC Centre of Excellence for Coral Reef Studies at James Cook University, pulling the initial database together was difficult, even with its focus on just peer-reviewed literature. This difficulty was due in large part to the recent surge in systematic conservation planning (and its attendant literature) worldwide. The rapid expansion of the literature means, however, that the time is ripe for a conservation planning database because there is tremendous potential for analyzing and synthesizing systematic conservation planning work and learning from it.

And, indeed, a new publication in Biological Conservation[32] took an initial look at the systematic conservation plans in the database and found a number of trends including:

- Increasing consideration of socioeconomic variables, land-sea planning, ecological connectivity, and climate change in conservation planning studies;
- Limited involvement of stakeholders in many planning exercises;
- A concentration of studies in the Northern European Seas, Mediterranean Sea, Coral Triangle Tropical Southwestern Pacific, Temperate Northern Pacific and off the coasts of South Africa, Australia, Chile, and the US; and
- Regions with high levels of anthropogenic impact but very few conservation planning studies, e.g. the South European Atlantic Shelf, Saharan Upwelling, Azores Canaries Madeira ecoregion, West and South Indian shelf, South China Sea, and Caribbean.

A free pre-print of the paper[33] is available on MarXiv.

What's next for the database?

James Cook University and partners, including the UNEP-World Conservation Monitoring Centre (WCMC), Imperial College, and the University of Maine, are now working to expand and improve the database. A top priority is adding a GIS/spatial module to allow storage of planning boundaries and maps of conservation priorities. "This information is practically absent from the peer reviewed literature and very patchy in the grey literature," says Álvarez-Romero. "Having this information will allow very powerful visualization and spatial analyses that are not possible yet," he adds.

Other critical next steps for the database include:

- Confirming that all of the marine systematic conservation planning work from the primary literature is in the database;
- Adding the grey literature to the database;
- Adding terrestrial and freshwater plans;
- Adding information about implementation and monitoring of conservation interventions associated with plans;
- Linking to other global databases, such as the World Database of Protected Areas, to track the development, implementation and impact of conservation planning; and

- Planning for the long-term hosting and maintenance of the database.

Add your own conservation planning exercises to the database

Planning exercises that: 1) define explicit conservation objectives, 2) identify spatially-explicit conservation areas, 3) use spatial optimization/prioritization, and 4) identify marine conservation areas are appropriate for addition to the database.

Use this online survey [34] to walk you through the process of adding studies.

Low cost methods, scaling up, and multi-stakeholder approaches: Experience and advice on marine ecosystem restoration from Indonesia [35]

Following the October 2018 article on marine ecosystem restoration [36], MEAM also had the opportunity to interview Rohani Ambo-Rappe, a lecturer at Hasanuddin University in Makassar, South Sulawesi, Indonesia. She shared her experiences and advice from her work on seagrass restoration in the region. She can be contacted at rohani.amborappe@gmail.com for further information.

MEAM: Can you briefly tell us about a few marine ecosystem restoration projects that you have worked on?

Ambo-Rappe: I am involved in a seagrass restoration project in the Spermonde Archipelago in South Sulawesi, Indonesia. This research-based project has been running since 2011 and has received funding from a number of sources including the Ministry of Higher Education of Indonesia, Hasanuddin University, and USAID. The goal of this project is to develop several methods of restoring seagrass that are simple and low-cost and can be scaled up for mass restoration efforts. As with many other seagrass restoration projects all over the world, we are still facing difficulties in controlling some environmental conditions, leading to low survival rates for the seagrass transplants and ultimately the failure of some restoration projects. Another important problem is that in Indonesia, ecosystems, unlike coral reef and mangrove ecosystems, are overlooked and not yet a conservation priority.

In addition to my project in the Spermonde Archipelago, my colleague Wawan Kiswara from the Indonesian Institute of Sciences (LIPI) did a long-term seagrass restoration project around Pari Island in Jakarta, Indonesia. The project was quite successful in terms of seagrass survival and coverage. It was also a research-scale project, however, and there are no plans to scale it up.

MEAM: How would you characterize the field of marine ecosystem restoration right now?

Ambo-Rappe: Unfortunately, in Indonesia, marine ecosystem restoration is generally only an important issue for certain organizations such as NGOs and the Ministry of Marine Affairs and Fisheries. A multi-stakeholder approach for this important issue is urgently needed but is not yet there.

MEAM: How do you suggest marine ecosystem restoration projects set baseline targets to aim for, especially in the face of climate change?

Ambo-Rappe: To measure the status and success of a marine ecosystem restoration project, a baseline of measurable parameters (e.g., seagrass coverage, rhizome extension, community structure of associated organisms) is needed. I have not been able to find any national or international standards for these baselines, so I am comparing parameters from my seagrass restoration project to those of the surrounding natural seagrass.

MEAM: If a degraded ecosystem has protected status, is there any way to figure out if the ecosystem will recover on its own or needs help?

Ambo-Rappe: In my experience, direct human activities such as aquaculture, housing, and coastal development directly affect seagrass restoration sites. In addition, natural factors such as waves, substrate movement, and herbivores are also important factors. Therefore, even if a degraded ecosystem has protected status to alleviate the direct human pressures, it may still need help to recover and/or to accelerate the process of recovery.

MEAM: What advice do you have for conservation/management groups that are considering putting resources into marine ecosystem restoration? In particular, do you have any rules of thumb for deciding if restoration of an ecosystem is feasible and practical?

Ambo-Rappe: Marine ecosystem restoration should be done with a multi-stakeholder approach – it cannot be done successfully by just by one or two agencies. What is needed are strict agreements that clearly state the responsibility of each agency in a program, including specific marine ecosystem conservation actions.

Restoring an ecosystem is feasible and practical if simple, low-cost, sustainable methods are used and communities are involved. Unfortunately, a lot of marine ecosystem restoration work is project-based and therefore not sustained. When the project ends, the restoration site is not maintained.

Do you also work in marine ecosystem restoration? Add your voice to the conversation by contacting MEAM editor Sarah Carr at meam@openchannels.org.

Printer-friendly version [37] PDF version [38]

Links
[1] https://meam.openchannels.org/news/skimmer-marine-ecosystems-and-management/check-out-our-new-tools-page
[2] https://meam.openchannels.org/tools
[3] https://meam.openchannels.org/news/skimmer-marine-ecosystems-and-management/estimating-vulnerability-ocean-planning-and-blue
[4] https://link.springer.com/article/10.1007/s13280-017-0959-x
[5] https://www.researchgate.net/publication/308778290_Ocean_planning_in_a_changing_climate
[6] https://www.researchgate.net/publication/322766139_Building_adaptive_capacity_to_climate_change_in_tropical_coastal_communities
[7] http://www.oceanplan-project.com/
[8] https://meam.openchannels.org/news/meam/management-move-making-ebm-and-msp-more-dynamic
[9] https://meam.openchannels.org/news/skimmer-marine-ecosystems-and-management/latest-news-and-resources-ocean-planners-and-6

[10] https://www.sciencemag.org/news/2018/10/key-climate-panel-citing-impending-crisis-urges-crash-effort-reduce-emissions
[11] https://www.washingtonpost.com/world/2018/10/11/few-countries-are-meeting-paris-climate-goals-here-are-ones-that-are
[12] https://www.washingtonpost.com/energy-environment/2018/10/31/startling-new-research-finds-large-buildup-heat-oceans-suggesting-faster-rate-global-warming/?utm_term=.4d3419a864d1
[13] https://www.eurekalert.org/pub_releases/2018-10/c-tos092718.php
[14] https://www.iddri.org/en/publications-and-events/policy-brief/ocean-based-measures-climate-action
[15] https://www.theguardian.com/environment/2018/oct/24/european-parliament-approves-ban-on-single-use-plastics-uk-eu-brexit
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[17] https://www.msp-platform.eu/practices/land-sea-interactions-maritime-spatial-planning
[18] https://www.msp-platform.eu/events/policy-brief-implementing-eba-msp
[19] https://octopus.zoo.ox.ac.uk/beta
[20] https://www.nespmarine.edu.au/document/comparative-assessment-pelagic-sampling-methods-used-marine-monitoring
[21] https://coast.noaa.gov/digitalcoast/training/gi-database.html
[22] http://www.apn-gcr.org/2018/08/22/pemsea-releases-instructors-manual-on-understanding-integrated-coastal-management-icm/
[23] https://www.msp-platform.eu/user-guidance
[24] https://newatlas.com/pingme-ghost-net-tag/56828/
[25] https://www.theguardian.com/environment/2018/oct/03/commercial-fishing-banned-across-much-of-the-arctic
[26] https://www.tri-cityherald.com/news/local/article220749855.html
[27] https://www.hakaimagazine.com/news/the-unexpected-upsides-of-the-hole-in-fire-island/
[28] https://keeptothepath.com/
[29] https://www.nature.com/articles/d41586-018-06871-7
[30] https://meam.openchannels.org/news/skimmer-marine-ecosystems-and-management/ebm-toolbox-learning-others-new-global-conservation
[31] http://database.conservationplanning.org/
[32] https://doi.org/10.1016/j.biocon.2018.06.027
[33] https://marxiv.org/h2jfv
[34] https://www.surveymonkey.com/r/conservation_planning_database
[35] https://meam.openchannels.org/news/skimmer-marine-ecosystems-and-management/low-cost-methods-scaling-and-multi-stakeholder
[36] https://meam.openchannels.org/news/meam/how-can-we-restore-marine-ecosystems-perspectives-and-tips-global-experts
[37] https://meam.openchannels.org/print/meam/issue/november-2018-122
[38] https://meam.openchannels.org/printpdf/meam/issue/november-2018-122