THE SKIMMER ON MARINE ECOSYSTEMS AND MANAGEMENT

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Mismatches between the scale of ecosystems and the scale of management: How practitioners are addressing this challenge

Marine ecosystem processes, as well as the various natural and human factors that influence those ecosystems, often operate at regional and global scales. Marine larvae can travel hundreds of kilometers before settling. Some adult marine organisms travel across oceans, as do some fishers. Polluted runoff into oceans can come from terrestrial sources across a continent. Climate change impacts ecosystems globally.

However, jurisdictional boundaries are found at local, provincial, and national levels. And management and conservation actions - such as regulation of individual fisheries, or designations of marine protected areas - typically occur at these spatial scales, too.

Such mismatches between the spatial scales of marine ecosystem processes and the spatial scales at which marine management and conservation are conducted can lead to ineffective or inefficient marine resource management and conservation efforts. This in turn can lead to declines in ecosystem health and loss of ecosystem services despite the stated intentions.

In the past decade, marine ecosystem-based management (EBM) and marine spatial planning (MSP) have been proposed as ways to address these mismatches. EBM by definition incorporates ecological boundaries in management. MSP provides a platform for large-scale planning that accounts for whole ecosystems.

In this issue, MEAM examines how, or whether, EBM and MSP initiatives have helped address these mismatches between the spatial scales of marine ecosystems and marine management. Alternatively, are there other innovations or trends for marine governance that have bridged the gaps? We hear from practitioners and researchers about how spatial scale mismatches have affected their work and how these mismatches are being addressed.

A. How MPA networks can address scale mismatches

By Rebecca Weeks

[Editor's note: Rebecca Weeks is a conservation planning research fellow at the Australian Research Council Centre of Excellence for Coral Reef Studies at James Cook University. Here she discusses the spatial scale mismatches inherent in regions with very local governance jurisdictions, such as customary marine tenure, and how MPA networks can address these problems.]

On scale mismatches in the Pacific

"In the Coral Triangle and Pacific Islands, governance jurisdictions tend to be very small. Local governments in the Philippines typically manage around 15 km of coastline (although this is highly variable). In regions with customary marine tenure, jurisdictions can be even smaller, with individual reefs owned by different clans or families. Scale mismatches are a problem because ecological features and processes that operate at spatial scales broader than these management jurisdictions cannot be adequately managed without cooperation.

"A recent study by Almany and colleagues,[1] for example, found that a grouper spawning aggregation catchment area (the area from which adult fish come to aggregate) in Papua New Guinea spanned the boundary between two customary marine tenure areas. To effectively manage that population would require cooperation between the communities. It is little use protecting fish on one side of the boundary if they are heavily fished on the other.

"So why not just make governance jurisdictions larger? In many regions where coastal communities are highly dependent upon marine resources, 'top-down' management strategies implemented by higher-level policy-makers are frequently perceived to ignore or be insensitive to local concerns. Local, community-based, 'bottom-up' management is better supported by stakeholders and typically receives higher levels of compliance. And there is good evidence that it can be effective in achieving local-scale objectives - see the work by Garry Russ and Angel Alcala in the Philippines."

On scaling up management using MPA networks

"Recent efforts to 'scale up' local management have focused on developing MPA networks. In the Philippines for example, these efforts have resulted in the formation of around 40 local government alliances.[2] These typically comprise between two and five municipalities who work together to collectively manage their marine resources. Similar initiatives have been developing across the Pacific and have been a feature of the Coral Triangle region.

"The critical question that needs to be asked is whether these networks are large enough (i.e., whether we are 'scaling up' enough) to resolve scale mismatches. Compared to the significant research effort that has been invested in identifying minimum effective sizes of individual MPAs, there has been a surprising lack of guidance on how large MPA networks need to be.

In practice, coordinated management efforts can resolve scale mismatches if two requirements are met. First, the extent of governance networks must be sufficient to encompass key ecological processes. Second, network managers must have the capacity to design and implement management actions that will ensure the persistence of those processes.

Recently, I reviewed the spatial extent of ecological connectivity processes and management institutions in the Coral Triangle region to assess whether these conditions are

being met. I found that governance networks are a promising strategy to help resolve social-ecological scale mismatches. Typically, their spatial extent is compatible with several key ecological connectivity processes that could not effectively be managed within individual jurisdictions. These processes include spawning migrations, larval dispersal, and connectivity between habitat types (e.g., coral reefs, mangrove and seagrass)."

On the need to scale up both planning and governance

"While governance networks increase the spatial extent across which management actions are coordinated, those actions may still be ineffective if they are designed and implemented with purely local perspectives. In other words, even though an MPA network may be large enough to encompass complementary habitat types and provide for larval connectivity between MPAs, MPA placement may be guided by local-scale concerns and may not achieve these objectives.

Thus, planning perspectives need to be scaled up alongside governance extent. At present, local managers are highly dependent upon assisting organizations such as NGOs to help them design and implement management strategies to achieve objectives related to regional-scale processes. In one of many such examples, the Wildlife Conservation Society has been working with ten communities in Kubulau, Fiji, to link their individually managed fisheries closures into a district-wide network (see Weeks and Jupiter 2013).[3] Moving forward, we need to build the capacity of local network managers to take on this role. There could also be an enhanced role for provincial government agencies to better coordinate local actions.

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[1] Almany, G. R. et al. 2013. Dispersal of Grouper Larvae Drives Local Resource Sharing in a Coral Reef Fishery. Current Biology 23:626-630. Elsevier Ltd.

[2] Horigue, V. et al. 2012. Marine protected area networks in the Philippines: Trends and challenges for establishment and governance. Ocean & Coastal Management 64:15-26.

[3] Weeks, R., and S. D. Jupiter. 2013. Adaptive comanagement of a marine protected area network in Fiji. Conservation Biology 27:1234-1244.

B. Bilateral and regional management bodies for Norwegian fisheries

By Alf Håkon Hoel

[Editor's note: Alf Håkon Hoel is research director for the Norwegian Institute of Marine Research. Here he emphasizes that fisheries management has been addressing scale mismatch issues for decades through the creation of and participation in bilateral and regional management arrangements. Norway alone is party to more than ten bilateral and regional arrangements (e.g., Norway-European Union, Norway-Faroe Islands) and a number of regional management bodies for fisheries (e.g., Northeast Atlantic Fisheries Commission), most of which were initiated in the 1970s.]

On the need to scale up governance for regional fisheries

"Most of the critically important fish stocks in Norway are distributed over very large geographical areas and are also shared with other countries. This necessitates multi-level governance systems where international cooperation is key to the setting of management strategies and decisions on total allowable catches, etc. The Norway-Russia Joint Fisheries Commission is an example of this. The decisions of the Commission must be implemented by each country's government respectively. This is where domestic legislation and institutions come into play. Scientific advice is provided by the International Council for the Exploration of the Sea, based on inputs from research institutions in Norway and Russia in particular."

On the establishment of bilateral and regional management arrangements

"In the 1970s, developments in international ocean law led to most states establishing 200-mile exclusive economic zones. This brought the bulk of what used to be international fisheries under national control. A period of intense institutional innovation ensued where bilateral and regional management arrangements - like the Norway-Russia Joint Fisheries Commission - were negotiated and domestic institutions were modified to take on new tasks. These fisheries arrangements have been in place for decades, long before MSP and EBM initiatives."

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C. MSP in Massachusetts

By Deerin Babb-Brott

[Editor's note: Deerin Babb-Brott is senior partner at SeaPlan, an independent nonprofit ocean science and policy group in the US, and also former Assistant Secretary for Oceans and Coastal Zone Management for the US state of Massachusetts. Here he discusses how MSP initiatives in Massachusetts have started to address issues of scale mismatch for the state and region.]

On addressing scale mismatches in Massachusetts

"It requires extraordinary effort to rationalize coastal and ocean laws and regulations that are narrowly drawn and operate independently. In the late 1990s-early 2000s in the face of a number of major marine development projects, Massachusetts recognized that it had no mechanism to consider the overall context for proposed projects and few effective coordination measures. The state also recognized that even projects that had consensus about their need and benefit (like some traditional energy, communications, and navigation projects) were subject to significant review and permitting delays due to lack of information and conflicting agency missions.

"In Massachusetts, the public and government recognized the tangible and immediate public benefits of investing in overcoming management disorder, and current MSP initiatives represent the beginning of a solution. In 2008, the Massachusetts legislature mandated the development of a management plan that helped to address many ecosystem-governance scale mismatches by:

1) Incorporating consideration of biodiversity and ecosystem health; special, sensitive, and unique estuarine and marine life and habitats; and interdependence of ecosystems; and

2) Coordinating uses that include international, federal, state and local jurisdictions.

"The resulting plan established a context for environmental projects and management measures that enable the state to manage its marine environment as a politically discrete component of a larger ecological system. The plan successfully addresses the challenge of disparate authorities frustrating informed and reasonably timely review, and state agencies must now coordinate their actions to achieve their individual management prerogatives. This leads to rational consideration of how numerous laws and regulations operate as a whole on the marine ecosystem, in service to social goals."

On the remaining challenges to be faced

The plan identifies but does not engage, however, the terrestrial, regional, or global conditions that comprise or affect the marine ecosystem of which Massachusetts waters are a part. This is a source of consternation to some and a pragmatic reckoning of capacity and political feasibility to others. As planning in Massachusetts, Rhode Island, and other states continues - and as those efforts merge with ongoing regional planning for the Northeast and Mid-Atlantic Exclusive Economic Zone - our ability to address more complicated questions will increase. Most importantly, a functioning model has been implemented and provides a management tool that will be tested and improved over time."

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D. MSP and learning networks in the Pacific

By Patrick Christie

[Editor's note: Patrick Christie, professor of Marine and Environmental Affairs and International Studies at the University of Washington (US), points to the benefits of learning networks to promote management strategies that can overcome scale mismatches.]

On scale mismatches in tropical contexts

"Mismatches between ecosystem and governance boundaries are common in tropical contexts where language and cultural diversity is high and decision making is frequently decentralized. In places like the Philippines or Indonesia, hundreds of languages are spoken within the boundaries of one Large Marine Ecosystem. Similarly, thousands of languages are spoken within the boundaries of the Coral Triangle region, which includes six countries with very distinct cultural norms and governance systems ranging from mostly centralized (Malaysia) to decentralized (the Philippines) policy making. So while Coral Triangle countries share high levels of marine biodiversity, share tuna and other marine populations, and are ecologically connected, they are socially distinct from one another."

On the impact of the Coral Triangle Initiative

"In this complex context, MSP and EBM have been used to encourage marine resource management. Most notably, the multilateral Coral Triangle Initiative (CTI) has made considerable progress toward the establishment of a Coral Triangle MPA System, an ecosystem approach to fisheries management (EAFM), and climate change planning. The new Coral Triangle MPA System is a form of MSP. Some of the areas within the system are large, zoned national parks while others are smaller MPAs managed through co-management mechanisms. Institutional and human capacity is being developed to implement EAFM. Climate change vulnerability assessments and plans are being developed in various contexts.

"In a recent study, we conducted thousands of social surveys and interviews at community, national, and regional levels within the Coral Triangle region and found progress in all these policy programs. While MPA enforcement remains challenging in the region, for example, 85% of national-level informants from the six countries report improvement in MPA enforcement due to CTI-related efforts. Another interesting finding is that a statistically significant higher number of local government officials report increased integration of MPA, EAFM, and climate change policies in program sites where CTI effort has been focused versus control areas not yet directly influenced by the CTI. Our social network analysis demonstrates that policy makers for the CTI are now linked together in a highly valued learning network that is fostering mentorship and leadership creation. Our report with many more results is available at www.uscti.org/uscti/Resources/LP%20report_FINAL.pdf

On the importance of learning networks

"One innovative governance solution that is particularly timely and necessary is learning networks. The creation of communication networks of resource users, resource managers, and national policy makers to diffuse information and lessons is a potent mechanism to speed progress. Learning networks such as the Locally-Managed Marine Area (LMMA) Network (www.lmmanetwork.org) connect people interested in MSP and EBM solutions throughout the Pacific. Many participants are committed to local efforts. The Regional Exchange meetings that support the CTI link mainly national-level policy makers. I would like to see significantly more investment in such learning networks at all relevant governance levels. Through such learning networks, context-appropriate mechanisms can be developed that meet both social and ecological goals at multiple scales. Solutions can emerge from within the network while benefiting from judicious and appropriate external technical support."

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E. A regional ocean governance framework in the Caribbean

By Robin Mahon

[Editor's note: Robin Mahon, professor of Marine Affairs and director of the Centre for Resource Management and Environmental Studies at University of the West Indies, describes fragmentation in responsibility for transboundary issues in the Wider Caribbean Region (WCR), and how the Caribbean Large Marine Ecosystem (LME) Project is starting to address this problem.]

On scale mismatches in the Caribbean

"With a full range of tropical marine ecosystems and more than 40 states and territories in close proximity, the WCR has struggled with issues of spatial and organizational scale for decades. Most responsibility for management and conservation is at the national level, but most ecosystems and resources problems are transboundary or are impacted by transboundary effects. In the WCR, transboundary issues are addressed by at least 25 organizations that have a mandate for some aspect of marine management. Since there is no coordinating mechanism for these organizations at the regional level, responsibility is fragmented, and each of the organizations deals with ecosystem scale and defines reasonable boundaries for management differently. The Organización del Sector Pesquero y Acuícola de Centroamerica (OSPESCA), for example, has made excellent progress with management of the Central American spiny lobster with its members in Central America, but Cuba and Colombia, which also have stocks, are not members. The FAO Western Central Atlantic Fishery Commission area does encompass all of the stocks but does not have the political connectedness OSPESCA does to get management decisions made."

On a regional ocean governance framework for addressing scale mismatches

"The Caribbean LME Project has helped focus attention on issues of scale in transboundary governance including mismatch and nesting of arrangements. The development of a regional ocean governance framework as a context for addressing transboundary issues is an important step for the region. It recognizes that while organizations may not be able to change their spatial areas of responsibility easily, provision for policy coordination among organizations with a view to harmonizing their approaches can help to address mismatches. Implementing this framework is the challenge for the region over the next 20 years."

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BOX: The problem of scale mismatches in the Mediterranean

"Conservation of marine ecosystems in the Mediterranean is greatly affected by scale mismatches. Virtually all MPAs in the Mediterranean are small-scale coastal ones. This practice leads to insufficient protection of key habitat in pelagic areas and the deep sea. It also compromises habitat integrity and survival until optimal reproduction for most migratory and deep water species. Several Fisheries Restricted Areas managed by the General Fisheries Commission for the Mediterranean provide some protection of those domains, but they only address fishing industry impacts, not other threats. As a consequence, several species linked to those areas remain threatened."

- Atila Uras and Daniel Cebrian Menchero

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