

Monthly news, analysis, and guidance on marine protected areas worldwide

## Managing an MPA on the uncertain frontiers of climate change

Under current greenhouse gas emissions rates, climate change will alter ocean ecosystems dramatically in the coming decades. According to a [study earlier this year](#) on MPAs and climate change, even no-take protections may not offer much long-term cover from dramatic disruption, including significant shifts in species and habitats.

This is why University of North Carolina biologist John Bruno, who led that study, apologized in advance for his “trite” answer when MPA News asked what advice he would give reserve managers. “I think all we can do is to push for a rapid reduction in greenhouse gas emissions,” Bruno said.

Point taken – but as long as the world can still turn around its greenhouse gas emissions trajectory, it is not yet time for MPA managers to throw up their hands and give up. A UN science panel, in a stark call to action issued in October, [said](#) the world still has time to limit warming to within 1.5 degrees Celsius if “rapid, far-reaching and unprecedented changes in all aspects of society” are made. What’s more, MPAs have a role to [play in mitigating emissions](#) by conserving blue carbon and “fish carbon” stocks.

It will not be easy. Many MPA managers can expect to manage for community- and ecosystem-level shifts even in an idealistic, best-case scenario. And while MPAs may not escape the effects of sustained warming over the next century, right now the world [is counting on them](#) to be refuges for ocean biodiversity.

MPA managers are already dealing with practical realities of climate change, which tend to stress already-slim management capacities and budgets. Often MPA managers are on the front lines of observing emerging changes in the ocean, even if it may not always be clear how to attribute them.

In 2017, [we had several experts](#) weigh in with advice on what MPAs can do about climate change over time. This month we ask practitioners what they are doing *right now* to address the challenges they’re already experiencing. And we ask them how MPA management strategies are changing to take emerging climate change trends into account, especially when there is uncertainty.

In next month’s issue, we will continue our climate change coverage but will focus on MPA planning as opposed to management, including how climate adaptation can be integrated in the design of new MPAs.

### Tracking down trends across oceans: Hawaiian Islands Humpback Whale National Marine Sanctuary (US)

For the last few winters, beginning [in late 2015](#), sightings of humpback whales have generally been occurring later and in fewer numbers within the [Hawaiian Islands Humpback Whale National Marine Sanctuary](#) and surrounding waters. Sanctuary staff and area scientists, however, don’t have enough data to entirely understand the trend or its causes.

That ocean warming is at work is a primary hypothesis, says Ed Lyman, the sanctuary’s natural resources management specialist and large whale entanglement coordinator. One theory is that warming may be changing the humpback whales’ food availability, causing their behaviors (habitat usage, migration, distribution) to change, he says.

If that is true, however, it is still hard to know whether long-term warming or a cyclical climate factor is at work. “Is it the El Niño?” says Lyman. “Or is it the Pacific Decadal Oscillation? Or is it something broader that is not cyclical, like climate change? We’re not there yet.”

Lyman says the sanctuary hasn’t hit any panic buttons yet. “We have been saying things like ‘the whale sightings are down,’” he says. “We don’t even know whether it’s their numbers that are down or if they’ve just moved elsewhere.”

So the challenge that the sanctuary is facing now is simply understanding what is happening. “We are looking at more ways to quantify the changes that we’re seeing,” he says. The sanctuary is taking two main approaches to this:

- *Collecting more data at home:* It is not easy to get a sense of overall humpback whale populations. “It’s a big ocean,” says Lyman. “They are big needles in a big haystack.”

“All of us have upped our game and have added different techniques and tools,” he says. “For example, the sanctuary wants to use drones more to better quantify the health of the animals.” In 2017, the sanctuary also hired a marine bioacoustics and whale behavior expert (Marc Lammers) whose expertise in studying whales through their sounds is certain to help.

- *Working across the whales’ range:* The Sanctuary has already collaborated with researchers and managers in Alaska – the location of the whales’ summer feeding grounds – but the collaboration is growing stronger in
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order to understand changes and trends across the population's range. Scientists in Alaska are also seeing similar trends, with fewer sightings and thinner whales in some areas.

In November, researchers from both states will hold a meeting in Hawaii to review current information and form a strategy to understand current trends. "We'll look at existing information and the tools and techniques at our disposal to fill in the gaps," Lyman says.

### **Making a realistic plan with community input: MPA Adapt project in the Mediterranean**

The Mediterranean is one of the marine regions already hardest hit by climate change. With more-tropical water temperatures have come invasive species, jellyfish blooms, shifts in native species ranges, and [mass mortality events](#), among other impacts.

Maria del Mar Otero, an expert in the marine program within IUCN's Centre for Mediterranean Cooperation, explains that another big challenge is that tourism within MPAs is increasing as the summer season comes earlier. "They need more staff, and they don't have it," she says. "So there is less funding and more administration and work to do, and more decisions to make."

As of 2016, few MPAs in the region had included climate change in their management plans. That year, partners from four countries launched [the MPA Adapt project](#) with five pilot sites: Brijuni National Park (Croatia); Pelagie Islands MPA and Portofino MPA (Italy); and Bonifacio Strait Nature Reserve and Port-Cros National Park (France). The project, which will conclude in May 2019, is supporting the five MPAs as they develop climate adaptation action plans and integrate them into existing management strategies.

## **Taking stock of Blue Carbon in MPAs**

Coastal habitats are among the most threatened on earth. And as these habitats degrade, humans are also losing a potent way of removing carbon dioxide from the atmosphere, according to a new synthesis of blue carbon science in the latest issue of [Science for MPA Management](#), produced by MedPAN.

That is why marine protection – especially of vegetated coastal habitats like mangrove forests, salt marshes, and seagrass meadows – can be an important climate change mitigation tool. Such "blue carbon sinks," largely near coasts, have some of the most intense CO<sub>2</sub> absorption capacities in the biosphere.

The report cites one study that concluded MPAs reduced mangrove loss in Indonesia by 14,000 hectares between 2000 and 2010, avoiding 13 million metric tons of carbon emissions. Evidence that marine protection can contribute to climate change targets can also help governments build broader support for conservation, the report notes. One barrier? Less than 20% of countries with blue carbon ecosystems reference them in climate mitigation plans, according to the report.

Ultimately, the goal for the partners is to learn from these five sites to lead other Mediterranean MPAs through the same process, as well as develop basin-wide approaches.

Otero says the project began with trainings for the MPAs on how to conduct rapid vulnerability assessments, related to both biodiversity and socioeconomic factors. Each pilot site has picked relevant indicators to monitor, such as fish stocks or seagrass health.

"Some are focused on tourism and fisheries, and others have been focusing on specific habitats or species," says Otero. "As part of the assessment, each is working with local stakeholders and discussing ideas for how an MPA might adjust its management plan or monitor changes."

For example, she says, MPAs can monitor climate change with fishers, or take a proactive approach to catching invasive species for consumption to keep their numbers down. "The focus of all the activities is not around the literal boundaries of the MPA, but around the broader social communities that are impacted by it," says Otero.

In this sense, capacity-building workshops with divers and fishers, as well as general awareness-raising activities, are important elements of the work. When the project is completed, each MPA will have its own "packet of activities" based on a menu of climate change strategies adapted from other regions.

One lesson from the vulnerability assessments is that it is important to choose a realistic initial timeframe. This is because there are few long-term climate change projections and scenarios at the local scale, Otero says, making it hard to create fine-tuned plans for far into the future.

"Most of the MPAs are projecting impact scenarios on a 20-year timeframe, using their monitoring data from recent years to project relatively near-term trends," she says. For individual sites, projecting beyond that 20-year horizon is difficult until longer-term data sets are ready at the local scale. In any case, says Otero, the managers recognize one thing: "To achieve a management plan in this time of climate change, they need to be able to see as far ahead as they can."

### **Grappling with emerging disturbance events: Caribbean and Gulf of Mexico MPAs**

Sargassum is a brown macroalgae that naturally drifts and aggregates in the Atlantic Ocean, providing essential habitat for several commercially important fish and protected species. It has always washed up on some Caribbean and Gulf of Mexico beaches. In moderate amounts sargassum has crucial benefits on shore, building beaches and supporting a flourishing ecosystem.

But in recent years, sargassum has become a growing social and economic nuisance in the region. Massive, unprecedented influxes of sargassum have turned previ-

ously white sand beaches into seas of brown, causing a bad stink as the algae decomposes and causing concern about tourism economies in some areas. Although the causes are complicated, scientists believe that both coastal pollution and [climate change](#) – through warming seas and changing winds and ocean currents – are among the factors involved.

It is an emerging problem for MPA managers in the region, says Emma Doyle of the Gulf and Caribbean Fisheries Institute (GCFI). And it is one that many are ill-prepared to deal with, based on [a 2017 capacity assessment](#) of more than 30 MPAs in the region that GCFI co-led through its MPACoast program.

In the assessment, most MPAs reported they have low capacity to respond to disturbance events in general, such as hurricanes or oil spills. “The sargassum influx is a good example of another type of disturbance event that’s affecting MPAs and challenging their management capacity,” says Doyle. What’s more, in the face of multiple competing needs, many managers don’t list capacity building for managing these kinds of events as a high priority.

Nonetheless, MPAs – especially along coasts where tourism is important – are being pressured to dedicate scarce financial, human, and infrastructure resources to sargassum removal. That is not always a good idea, says Doyle. “Efforts to clean sargassum from MPAs are particularly challenging and sometimes questionable,” she says. “In theory, MPAs – more than anywhere – are the place to let nature take its course.”

She acknowledges, though, that where the sargassum influx has been particularly extensive, MPAs face the same negative impacts as other coastal areas. The rotting smell of hydrogen sulfide, for example, and detrimental effects on water quality from in-water decomposition can negatively impact the health of important reefs, seagrass, and associated sea life that MPAs seek to protect. “So the pros and cons of cleaning/removal of sargassum in MPAs need to be weighed carefully,” says Doyle.

She says some in the private sector are turning to costly and untried infrastructural solutions to the sargassum invasion, and these could bring further environmental impacts on coastal habitats or exacerbate beach erosion. “In the rush to tackle the sargassum influx we are seeing over-grooming of beaches by hotels located within some MPAs, with ever-worsening beach erosion and a toll on sea turtle nesting and hatching,” she says.

So what are the near-term solutions that could be explored for MPAs and beyond?

GCFI has worked to provide guidance on specific best practices for beach cleaning, but Doyle says there is a real need for response planning at a national level. This kind of response would agree on priority beaches and other areas such as fisheries landing sites to clean, support communica-

## Strong climate action could save World Heritage reefs

There is a lot of discouraging news for coral reefs these days but [a recent UNESCO report](#) provides a small – if challenging – ray of hope. If the world can contain global temperature rise to within 1.5 degrees Celsius, which is the long-term target under the global Paris Agreement, the UN agency says World Heritage reef sites could potentially survive climate change.

The analysis looks at all 29 coral reef areas listed as World Heritage sites. Under business-as-usual greenhouse gas emissions, 25 out of 29 areas would severely bleach twice a decade by 2040, and all would experience annual severe bleaching by the end of the century. Many would cease hosting coral at all. However, if the world stays within a 1.5-degree target, severe annual bleaching would be avoided and only four areas would likely experience twice-a-decade impacts. Work is ongoing to revise the World Heritage committee climate change policy.

tions so that communities and visitors know where to find clean beaches, and set best practices for beach cleaning and appropriate disposal of the sargassum. Doyle cites some recent useful responses:

- The Cayman Islands Department of Environment recently adapted GCFI’s best beach cleaning practices to fit with their regulations and processes.
- Saint Lucia Fisheries Department has developed a national sargassum response plan.
- Barbados Sea Turtle Project has developed protocols for rescuing and reviving sea turtles stranded in sargassum.
- STINAPA Bonaire, the national parks foundation, rallied the community island-wide to help clean up Lac Bay, an important Ramsar site.

Beyond the sargassum issue, Doyle cites several other ongoing climate management projects in the Caribbean region. For example, [a Local Early Action Planning \(LEAP\) tool](#) has been adapted from the Pacific to the Caribbean, and proven valuable in helping MPA managers and communities to work together in planning for adaptation to climate change, she says. Analyzing the possible impacts of climate change on the biology and ecology of commercially important species can help fishers associated with MPAs anticipate changes in catch and fishing effort. Developing coral bleaching monitoring and response plans is another activity that Caribbean MPA managers are undertaking.

More broadly, says Doyle, “When it comes to climate change, partnering with communities and with relevant agencies is important as MPAs can’t do it alone. But they can manage for resilience and can catalyze action and resources for sustainable livelihoods.”

## Developing flexible and responsive management plans: Nosy Hara MPA, Madagascar

In 2017, Nosy Hara National Park in northwest Madagascar became one of [the first MPAs in the country](#) to incorporate climate change in its management plan. (Nosy Hara is managed by Madagascar National Parks and is part of WWF's high-priority Northern Mozambique Channel trans-boundary seascape.) This emerged from an EU-funded project that examined climate change at Nosy Hara and five other MPAs worldwide. Through the project, WWF and partners developed a methodology called [CAMP](#) – Climate Adaptation Methodology for Protected Areas – which guides MPA managers to integrate climate change issues in their work.

Harisoa Hasina Rakotondrazafy, WWF's climate change adaptation coordinator in Africa, says Nosy Hara is already experiencing climate change issues including higher sea temperatures, less rainfall, higher salinity in the dry season, and more intense winds. The winds are now limiting the local community's ability to pursue open sea fishing – their main source of income – during a longer part of the year than in the past.

“Based on the climate change vulnerability assessment done in Nosy Hara five years ago in partnership with several experts, coral reefs are in relatively good health and appear to be recovering from a recent bleaching event,” says Rakotondrazafy. “However, fish populations are exhibiting signs of overexploitation and could compromise the ability of the reefs to recover from future bleaching events.” For mangroves, she says, climate change is exacerbating the impact of anthropogenic pressures on already degraded forests. In turn, this combination of climatic and non-climatic stresses is increasing the vulnerability of seabirds and marine turtles that nest in the mangroves.

According to [a WWF case study report](#), Nosy Hara's vulnerability assessment helped identify priority adaptation

options to support the MPA's strategies. These included mangrove restoration and supporting coral reef resilience, as well as creating alternative income sources for the local fishing community to lessen their dependence on fisheries. Findings supported the update process of the Nosy Hara Management Plan in 2017.

“Climate change was particularly considered at the threat analysis level, which looks at climate implications for the conservation targets and people's livelihoods,” says Rakotondrazafy. “The vulnerability assessment done in Nosy Hara was the first of its kind and really helped to put in place the baseline regarding climate-related information.”

A big challenge was that long-term and downscaled (local-level) climate information on coastal and marine areas – information needed to inform the threat ranking – was often missing. “Rigorous and continuous monitoring of climate data, coupled with ecological monitoring, will be key to help track the impacts on key conservation targets and to put in place the right strategy,” she says.

She notes that distinguishing between climate and non-climate concerns – while also recognizing their interrelation – can be difficult. “Linking the climate and non-climate threats is generally an issue where it creates some complications in the threat analysis,” she says. “We should not see climate change as a stand-alone threat. There is a need to look at how it directly affects the targets and how it exacerbates the existing anthropogenic threats. MPAs need to manage both types of threat.”

## Conservation targets in the long term: Takeaway thoughts

On a longer time scale, as climate change continues to affect conservation targets, Rakotondrazafy expects MPAs will need more creative thinking and flexibility.

“The key question to ask is whether the core of the current MPA will still be viable in the future, in terms of climate impacts and other risks,” she says. “MPA managers need now to look at larger management scales, like building more connections with neighboring MPAs. Because in the future, species will migrate to find more suitable areas, ecosystem function may change, and people from inside an MPA may move to other places, or new people may come to the area.”

Along those lines, MPA News returned to Ed Lyman of the Hawaiian Islands Humpback Whale National Marine Sanctuary to ask him a hypothetical question. What would happen if whales stopped coming to their namesake MPA?

“It's way too early to go down that path,” says Lyman. But if it does eventually happen, he says, it would certainly mean a change. “It would take our primary role away: protecting humpback whales and their environment. For the sanctuary, it would mean we would adjust our mission or we would move elsewhere, so to speak.”

## Additional climate change coverage in MPA News

[MPA News poll: Amid a changing climate and ocean, what can MPA managers do?](#) (2017)


[New Report on Ocean Warming Highlights the Role of MPAs in Combating Climate Change](#) (2016)

[How MPAs can help mitigate impacts of climate change via coastal blue carbon, “fish carbon”, and more](#) (2016)

[MPA Perspective: Climate Change and the U.S. National System of MPAs - Why Places Are Important](#) (2008)

[In an Era of Climate Change, How Can Managers Ensure that Today's MPAs Remain Relevant Over Time?](#) (2006)

John Bruno at the University of North Carolina, whose climate research led off this article, says that as baselines shift, MPA managers may need to rethink their whole concept of what they are preserving.

“One of the strongest signals we’re seeing is species range shifts,” he says. “This means changing composition in most of the world’s reserves. I think managers, over the decadal time scale, need to keep in mind that they may not be preserving specific populations, as environmental conditions change. They may have to change their thinking a bit and focus on preserving ‘nature’ – i.e., whatever species make it to a particular place and can tolerate or thrive in the conditions of the moment – and not obsess about preserving what’s there right now. Because in most reserves, that’s going to continue to change.” 

- *This article was reported by Jessica Leber.*

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# Perspective: First reports from comprehensive, in-depth study of a large remote MPA

By Rachel Jones

On 11 September 2018 the [Bertarelli Foundation](#) hosted its first Marine Science Symposium, at the Royal Geographical Society in London. The event was a showcase for the first full year of activities in the Bertarelli Programme in Marine Science – a program that focuses entirely on the 644,000-km<sup>2</sup> British Indian Ocean Territory (BIOT) marine protected area, which includes the Chagos Archipelago.

From 2017 to 2021, the first phase of the program, scientists are applying an unprecedented level of private funding for research in a single MPA – US \$12 million – to determine to what extent this large, remote site is delivering species protection and resilience.

The research program involves more than 60 marine scientists and conservationists. This brief essay gives a synopsis of the main findings from the London symposium.

## Sentinel species

BIOT is a regionally important hotspot for highly mobile ‘sentinel’ species such as pelagic sharks, tuna, seabirds, and turtles. The presence, abundance, and behavior of these species can help indicate an ecosystem’s general health and function.

So far 413 tags have been attached to animals from ten species of pelagic predators including grey reef sharks (*Carcharhinus amblyrhynchos*) and silvertip sharks (*Carcharhinus albimarginatus*). Their tracks are revealing how they use this large MPA and the regional seas beyond its boundaries<sup>1</sup> (presented by Prof [Barbara Block, Stan-](#)

[ford University](#)). Results from 256 tagged red-footed and brown boobies are showing foraging trips of hundreds of kilometers that are still contained within the MPA boundary (presented by [Hannah Wood, ZSL](#)). Tagged nesting green turtles (*Chelonia mydas*) return to their foraging grounds on seagrass beds across the region as far north as Somalia<sup>2</sup> and can be used to identify previously unidentified habitats<sup>3</sup> (presented by Dr [Nicole Esteban, Swansea University](#)). Network studies of reef shark behavior based on data from an acoustic array are revealing detailed patterns of their distribution and their subsequent vulnerability to illegal, unreported, and unregulated (IUU) fishing<sup>4</sup> (presented by Dr [David Jacoby, Zoological Society of London](#)).

## Coral reef recovery

BIOT represents some of the last oceanic wilderness left in the Indian Ocean.<sup>5</sup> However, despite its remote location and low level of proximate anthropogenic influences, it still faces pressure from widespread coral bleaching and subsequent changes to reef structure and species composition as a result of climate forcing. Decades-long data sets tracking the changes in the reefs of BIOT have shown good recovery from previous bleaching events. The next four years will provide an opportunity to track the latest response in more detail than has previously been possible (presented by Prof [John Turner, Bangor University](#)). This work will contribute to a better understanding of the mechanisms for recovery in what is effectively a baseline environment relative to other reefs in the region.

## Editor’s note:

Rachel Jones is project manager for the Bertarelli Programme in Marine Science, which is coordinated by Zoological Society of London (ZSL).

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## Science for management

The aim of the program is to create a substantial body of scientific research that can be used to inform and support management efforts in this MPA and others regionally. Research presented by Prof [Nick Graham \(Lancaster University\)](#) showed that pelagic sources of nutrients brought to the islands by nesting seabirds contribute to increased growth rates of species far out on the reefs around the atolls, particularly compared to those around islands with invasive rats.<sup>6</sup> This elegant study from BIOT gives a powerful example of how practical field ecology can be used to support and inform conservation management activities such as rat eradication. It also provides evidence for how an MPA of this size can protect an entire ecosystem and maintain the functional links between habitats from the open ocean, through the islands to the reefs.

The program feeds back regularly to the BIOT Administration on management of the MPA, in multiple ways:


- We interpret all published science to draw out management-relevant findings;
- We summarize all main findings from each research expedition;
- We contribute science expertise directly to the BIOT management planning process, and to regional programmes such as [FAD Watch](#) (addressing issues with regard to fish aggregating devices) and the [Indian Ocean Tuna Commission](#) (IOTC);
- We will produce a managers summary report at the end of our first full year of science (2018) and annually thereafter. The reports will pull together highlights from each year's science into a series of actionable points that can be used to plan management activities such as prioritizing islands for de-ratting.

## Sharing MPA experiences

A series of workshops after the symposium included a half-day session with a team from the 1315-km<sup>2</sup> Turneffe Atoll Marine Reserve in Belize (also supported by the Bertarelli Foundation). Despite differences between the MPAs – including in size, proximity to human populations, and types of fishing pressure – the two teams were able to find shared areas of experience. In particular the challenges of making scientific research accessible and relevant to MPA managers were reviewed and the MPAs' respective approaches compared.

All presentations from the symposium can be found online [here](#).

Follow the work of the program at [@BIOTscience](#) and [Fondation Bertarelli](#). The next phase of the program will start in mid-2019, building on recent successes while also adding new ideas and projects.

The research program is actively seeking collaborative partnerships, particularly with researchers and MPA practitioners in the wider Western Indian Ocean region. Interested parties should contact [BIOTscience@zsl.org](mailto:BIOTscience@zsl.org), from where they can be put in touch with the most relevant members of the team for further discussions. 

## For more information:

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# MPA Training in a Nutshell: On governance

By Anne Nelson and the IMPACT team

Our IMPACT training team has spent a lot of time lately on building capacity for good governance. Good governance may be viewed as applying a set of internationally accepted principles for governing protected areas. These include equity, inclusivity, accountability, efficiency, responsiveness, transparency, and more.<sup>1</sup> MPAs that effectively apply these good governance principles can have sustained support and resiliency, and can meet multiple community and conservation goals.

You can see this in the [Programme of Work on Protected Areas](#) of the Convention on Biological Diversity. The Programme supports integrating good governance principles in all protected area decision-making, including respect for rights and the rule of law; promotion of constructive dialogue and fair access to information; accountability in decision-making; and existence of institutions and procedures for fair dispute resolution.


Of course, the encompassing frameworks in which these principles are applied can take different forms. Some MPAs are effective with centralized governance, for example, while others feature co-management, local governance, or even private governance.

There is a lot of useful guidance available on MPA governance, including [guidelines from IUCN](#) that outline assessment mechanisms and case studies, and MPA News interviews with governance expert Peter Jones and others ([here](#) and [here](#)). Below we highlight another good source, an [issue brief on MPA governance](#) by the Regional Activity Centre for the Protocol Concerning Specially Protected Areas and Wildlife for the Wider Caribbean Region (CAR SPAW RAC). Here we've adapted some of the brief's tips on building good governance:

- **Embrace a holistic approach.** MPAs are increasingly embedded within complex governance systems such as integrated coastal management, ecosystem-based management, or marine spatial planning processes. These larger frameworks tend to be more effective than uncoordinated or isolated efforts at facilitating knowledge sharing and cooperation among governing bodies, incorporating public interests, using science and technology, and considering the marine ecosystem as a whole, including humans.

- **Strive to achieve clarity.** A well-formulated legislative framework enhances coastal and marine policy development, management planning, law enforcement, and decision-making. Effective governance structure requires clear objectives as well as broad understanding and acceptance of the roles and responsibilities of government agencies, co-management authorities, and other interested parties.

- **Cultivate leadership and political will.** Effective governance requires strong leadership based on integrity and good faith actions, open and honest communication, long-term commitment, and the presence of supportive partners across the network of government authorities, NGOs, and stakeholders. Garnering early support among policymakers is critical, too, particularly when developing the legislative framework and any associated planning documents.

- **Involve stakeholders early and often.** Effective governance often depends on the ability of people from different backgrounds and perspectives to understand each other's needs and come to mutual agreement on a comprehensive vision that incorporates economic, social, and environmental concerns. Initiating outreach during early planning stages of an MPA is a critical first step. 

## For more information:

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## To comment on this article:

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## Editor's note:

This recurring column, MPA Training in a Nutshell, distills advice from what is the largest and longest-running MPA management capacity training program in the world – the [International MPA Capacity Building Team](#), or IMPACT. Run by the US National MPA Center (within NOAA's Office of National Marine Sanctuaries), the program has trained thousands of MPA managers in more than 40 countries.

Anne Nelson co-leads IMPACT. In these columns, Anne is sharing quick and useful tips – best practices gathered by IMPACT from MPA managers worldwide.

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<sup>1</sup> Borrini-Feyerabend, G., N. Dudley, T. Jaeger, B. Lassen, N. Pathak Broome, A. Phillips and T. Sandwith (2013). [Governance of Protected Areas: From understanding to action](#). Best Practice Protected Area Guidelines Series No. 20, Gland, Switzerland: IUCN. xvi + 124pp.

## MPA Science Corner

### Blue Economy – Coral bleaching – Effectiveness of community-based MPAs – MPAs in Oceania – MPA targets – Large-scale MPAs

These recent articles or preprints on MPA-related science and policy are all free to access.

- **Preprint:** Voyer, M., et al. [Shades of blue: what do competing interpretations of the Blue Economy mean for oceans governance?](#) Journal of Environmental Policy & Planning 20, 595 - 616 (2018).

Finding: This paper examines different interpretations and applications of the term *blue economy*, in which oceans are viewed variously as a source of natural capital; as opportunities for poverty reduction; or as the basis for major maritime industry sectors. Areas of consensus and conflict in these definitions are explored.

- **Article:** Jackson, R., Gabric, A. & Cropp, R. [Effects of ocean warming and coral bleaching on aerosol emissions in the Great Barrier Reef, Australia.](#) Scientific Reports 8, (2018).

Finding: When Great Barrier Reef coral reefs are stressed by heat, they release volatile sulfur compounds that help them cope with stress. These compounds contribute substantial aerosols to the atmosphere, which acts as a natural, biological ocean thermostat, changing atmospheric conditions so as to lower heat stress. But there seems to be tipping point. As sea temperatures rise, corals may be losing this ability to form these climate-moderating emissions.

- **Preprint:** Smallhorn-West, P. F., Bridge, T. C. L., Malimali, S., Pressey, R. L. & Jones, G. P. [Predicting impact to assess the efficacy of community-based marine reserve design.](#) Conservation Letters e12602 (2018). doi:10.1111/conl.12602

Finding: In Tonga, no-take marine reserves designed with, and managed by, local communities are predicted to achieve a conservation impact – i.e., increased target species biomass – that is nearly as great as reserves designed to maximize conservation impact. (The community-based MPAs are projected to achieve 84% of potential recovery, compared to 100% for systematically designed sites.) The result suggests that community-based marine management can be highly effective, in this case because reserves are located near villages that exert fishing pressure.

- **Preprint:** Friedlander, A. M. [Marine conservation in Oceania: Past, present, and future.](#) Marine Pollution Bulletin 135, 139 - 149 (2018).

Finding: In Oceania, there is a resurgence of ocean management that incorporates customary local practices and

governance. This review explores how this renaissance has resulted in more effective management, but also requires hybrid approaches that incorporate elements of both modern and traditional practices.


- **Preprint:** Smallhorn-West, P. & Govan, H. [Towards reducing misrepresentation of national achievements in marine protected area targets.](#) Marine Policy (2018) doi:10.1016/j.marpol.2018.05.031

Finding: In the World Database on Protected Areas – which tracks progress toward achieving the Convention on Biological Diversity's Aichi Target for marine protection by 2020 – MPA coverage for the Pacific Island nation of Tonga is misrepresented by two orders of magnitude, while MPA coverage for Kiribati is effectively double-counted. This case study highlights a larger-scale issue in ensuring accuracy and accountability in the WDPA data and also questions the wisdom of using protected area coverage as a metric.

- **Preprint:** Nikitine, J., Wilson, A. M. W. & Dawson, T. P. [Developing a framework for the efficient design and management of large scale marine protected areas.](#) Marine Policy 94, 196 - 203 (2018).

Finding: The 840,000-km<sup>2</sup> Pitcairn Islands Marine Reserve, designated by the UK in September 2016, is examined as a case study in the effective design and management of large-scale MPAs. The reserve is evaluated against 10 criteria, which could be adapted for other large-scale MPAs, and initial findings show its design to be satisfactory.

For a free, weekly list of the latest publications on ocean planning and management, including MPAs, [subscribe to the OpenChannels Literature Update here.](#)

In addition, [OCTO](#) – the organization that produces MPA News and OpenChannels – also runs [MarXiv](#), the free research repository for marine conservation science and marine climate change science. Each week the MarXiv team produces [brief, one-page summaries of selected papers](#) in its repository for an audience of managers and policymakers. Share your research in MarXiv now and we may summarize your paper, too! 

**To comment on MPA Science Corner:**  
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## Notes & News

### Commercial fishing moratorium in central Arctic Ocean is signed

Eight nations met in Greenland in October to sign a historic formal agreement, first announced [in November 2017](#), that bans commercial fishing across much of the Arctic for the next 16 years.

Although there has been no fishing in the 2.8 million km<sup>2</sup> region yet, rapidly melting sea ice is now opening up the high seas waters for fishing and other commercial activities. The agreement marks one of the first times nations have proactively protected a marine ecosystem before commercial fishing commenced, [according to](#) The Pew Charitable Trusts.

The signatories – Canada, China, Denmark, the EU, Iceland, Japan, Norway, Russia, South Korea, and the US – all agreed to a new joint science research and monitoring program that will help better understand the region's baseline ecosystem and its rapidly changing conditions. Read an interview with a US negotiator of the agreement [here](#).

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### Legal challenge to US marine national monument is dismissed

US fishing industry groups [were recently defeated](#) in their legal challenge to the Northeast Canyons and Seamounts Marine National Monument, a 12,720-km<sup>2</sup> MPA that former US President Barack Obama designated in 2016 as the nation's first marine national monument in the Atlantic Ocean.

The plaintiffs argued that the Antiquities Act – a 1906 law under which the designation was made without requiring congressional approval – did not apply to ocean protection, and therefore challenged whether a US president had the right to establish a marine national monument at all. The Natural Resources Defense Council, an environmental group, [called](#) the judge's rejection of the lawsuit a "major win that benefits all the country's marine monuments."

A lot was at stake: US marine national monuments cover a total of 3 million km<sup>2</sup> of marine area, including the 1.5 million-km<sup>2</sup> Papahānaumokuākea Marine National Monument in the northwestern Hawaiian Islands.

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### High seas science collection

The high seas are under high threat. That is the theme of a [special open-access collection](#) of eight research articles on the science of the high seas – the 60% of the ocean outside of national jurisdiction.

Published in Science Advances, the articles cover topics such as deep sea mining and long-distance fishing fleets,

and examine challenges in balancing long-term ocean conservation with short-term interest in exploiting the value of the ocean's remote regions. In an editorial, editors of the collection conclude that "institutions and governments do not have adequate tools to keep pace with those who work to overexploit the high seas."

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### Marine turtle protection: Call for proposals

Does your MPA include sea turtle habitat? Then you might want to check out this [funding opportunity](#) from the US Fish and Wildlife Service. Under its Marine Turtle Conservation Fund, the agency wants to fund conservation in turtle ranges that are outside of the US and its territories. Projects that identify specific actions that can create long-term benefits will be prioritized. About 40 to 45 projects are usually funded, and the deadlines are 26 November 2018 and 1 April 2019, depending on the timing of the local nesting season in the project area. More details [are here](#).

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### MedPAN seeks new small projects

There are now three new funding opportunities for MPA managers and collaborating organizations in the Mediterranean region. MedPAN [is seeking proposals](#) for new small projects that directly support concrete actions to improve management, pilot new strategies, or develop useful tools.

One call for proposals is looking for projects that facilitate the sustainable management of marine turtles, such as nest relocations or climate adaptation strategies. Another is seeking habitat mapping proposals within five specific sub-regions. Finally, there is a general call for proposals along broad management themes. More information on how to apply is [here](#).

Please note the deadline is coming up soon – 28 October 2018.

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### Call for nominees for The Ocean Awards


Blue Marine Foundation and Boat International [are soliciting nominations](#) for the 2019 edition of The Ocean Awards, which celebrate individuals and projects that have made outstanding contributions to the health of the world ocean. The deadline for nomination is 16 November 2018. The five categories for nomination are "The Local Hero", "Science", "Innovation", "Visionary", and "Public Awareness". The [2018 edition of The Ocean Awards](#) recognized several individuals and campaigns related to MPAs.

## A 'Big 5' safari, in the ocean

Safaris are a big industry in Kenya that also help to drive conservation, with tourists out to spot each of the “big 5” animals: buffalo, elephants, leopards, lions, and rhinos. That is why Kenya’s Watamu Marine National Park, a UNESCO biosphere reserve north of Mombasa, is now promoting its “big 5” – dolphins, sea turtles, whales, whale sharks, and billfish – as a marketing tool. The park expects about 20,000 tourists this year and is looking to grow its international visitorship, according to [a local news outlet](#).

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## MPAs in consideration for Australia’s ‘7 natural wonders’ contest

Australia’s largest online travel portal is running [a contest](#) in partnership with several conservation-focused NGOs and government groups, and they want your vote. The goal is to determine Australia’s seven natural wonders from a list of three dozen nominees. Several MPAs, and features within particular MPAs, are in the running, including the Great Barrier Reef, Lord Howe Island, 12 Apostles, and the Phillip Island Penguin Parade. Just make sure you’re a human – the site warns they are keeping watch for online bots that try to swing the vote count. 

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## From the MPA News vault

### Features and news items from yesteryear

#### Five years ago: [September-October 2013](#)

- US and New Zealand scale back proposal for Ross Sea MPA in bid for other nations’ approval
- Four new global MPA task forces to launch at IMPAC3 in Marseille in October

#### Ten years ago: [October 2008](#)

- Huge No-Take Area Proposed for Australian Coral Sea
- Perspective: A Role for Marine Conservation Agreements

#### Fifteen years ago: [October 2003](#)

- At World Parks Congress, Target Is Set for High-Seas MPAs: Five to Be Designated by 2008
- Revisiting a Capacity-Building Project for MPA Managers in the Western Indian Ocean

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