



## THE 10X20 INITIATIVE

Conference on  
**Marine Protected Areas: An Urgent Imperative**  
**A Dialogue Between Scientists and Policymakers**  
Rome, Italy  
March 7-9, 2016

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# A PRIMER ON MARINE PROTECTED AREAS BACKGROUND FOR THE 10X20 CONFERENCE

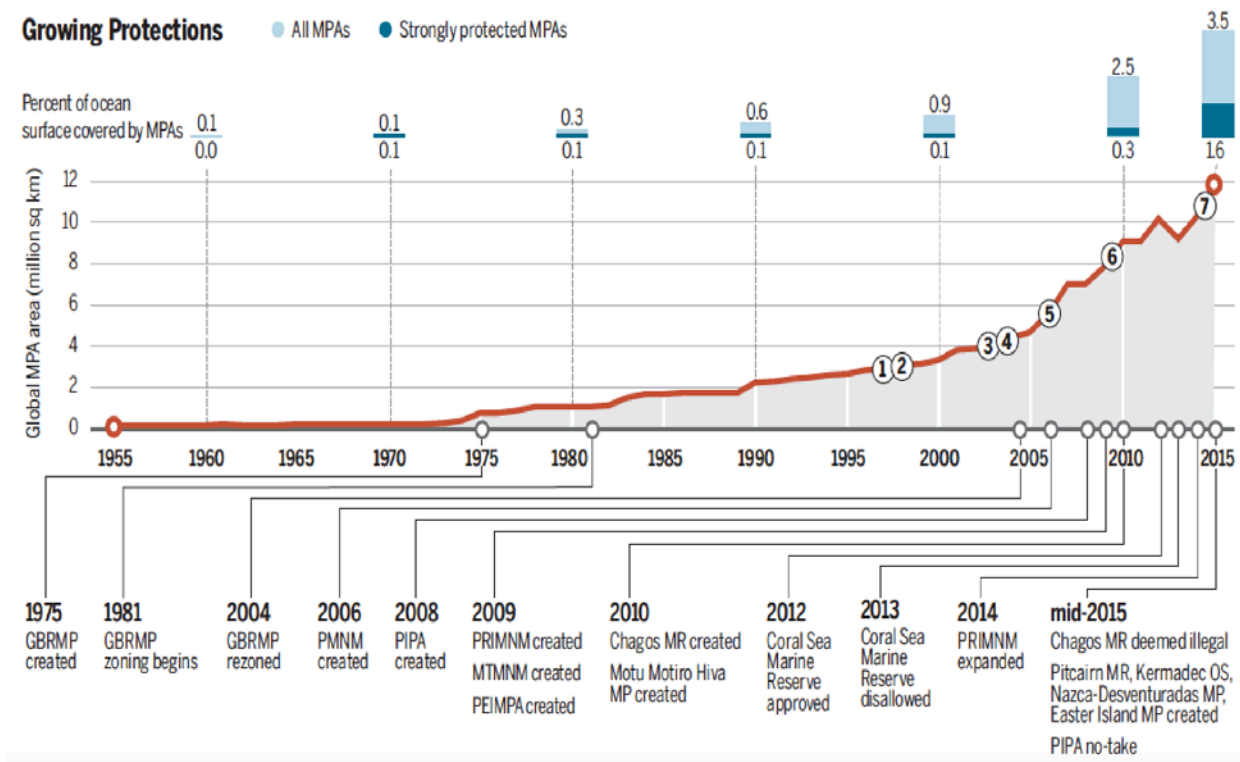
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The science is increasingly clear that the establishment of a network of marine protected areas (MPAs) throughout at least 10 % of coastal and marine areas by the year 2020, would help conserve and restore marine biodiversity and assist in regenerating wild fisheries. A greater percentage of protection could pay more significant benefits.

Marine Protected Areas (MPAs) is an umbrella term that encompasses virtually any type of refuge that provides some level of protection. The term “Marine Reserve” applies to fully protected areas that prohibit all consumptive or extractive uses, including fishing, and for which human interference is minimized. Strongly protected areas exclude all commercial activities, but allow low levels of extractive activities for subsistence or artisanal fisheries. In contrast, lightly protected areas offer limited safeguards, while typically allowing substantial commercial extractive activities.

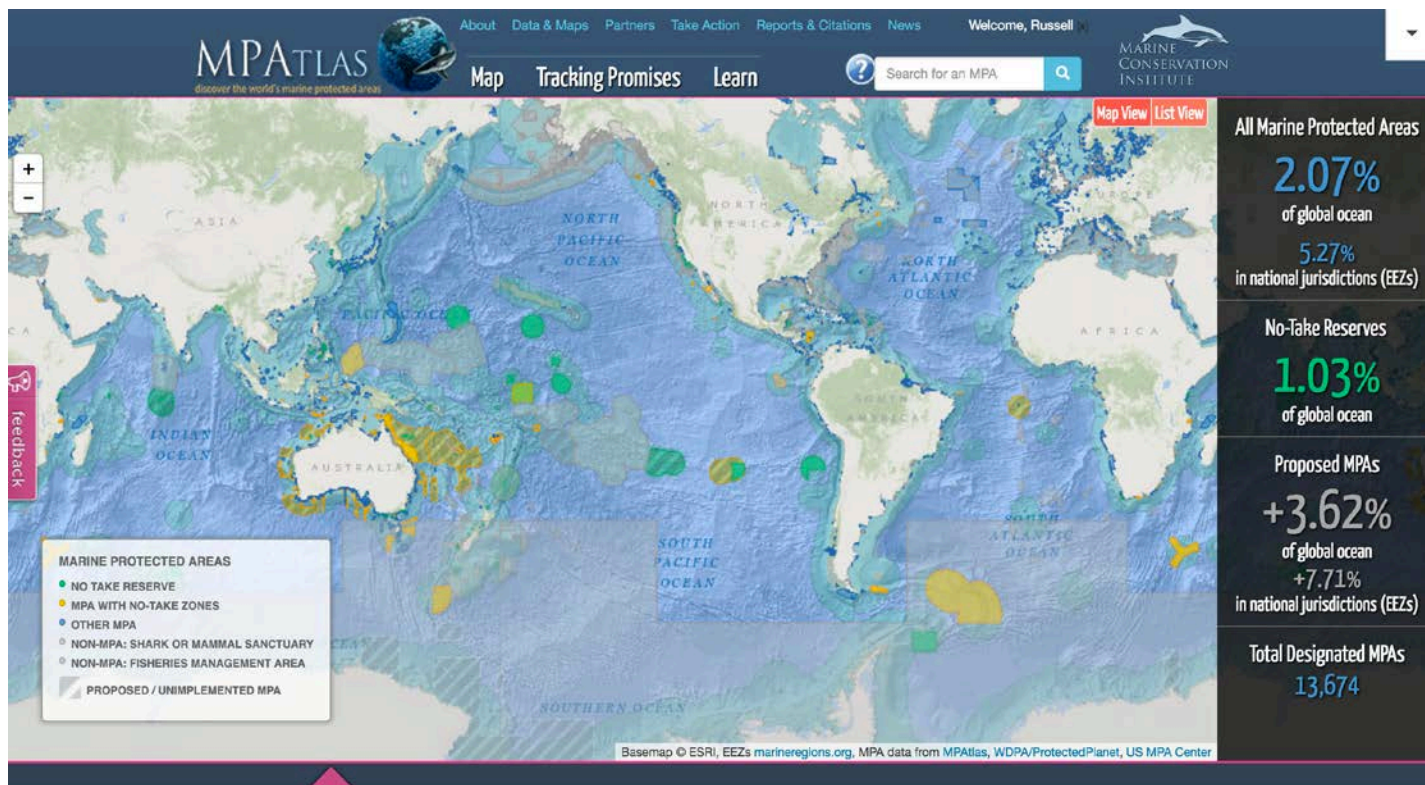
Virtually every country with a marine coastline has declared one or more marine protected areas. There are more than 11,000 marine protected areas in existence; collectively they comprise only 3.5 % of the ocean surface (Lubchenco, 2015).<sup>1</sup> While a very low percentage of the total ocean is protected, there has been significant progress during the last decade, with protection increasing from about 0.9 % of the ocean in 2000, to 3.5% currently (refer to Figure). However, most MPAs are only lightly protected, with less than a third of the total fully protected. Thus, we have a long way to go to reach the 10X 20 goal, and the stretch is even more daunting if the goal is for strongly or fully protected areas.



MPAs conserve biodiversity, enhance resilience, enhance fisheries, and act as an insurance policy if other types of fisheries management do not work. They protect and restore endangered species and ecosystems. They are sites for education and research. They can attract tourists and provide alternative livelihoods for communities. The reserves are capable of bringing back life and restoring key processes like water purification and carbon capture. In addition, they play a significant role in protecting and bringing back the large old fish that have always been the engines of reproduction and population replenishment. Animals that live longer are capable of producing more progeny. Reserves can bring them back; conventional fisheries management will not. The more larval and adult offspring there are, the farther afield they will travel, promoting fisheries and building resilience over large areas.

Existing MPAs are within national jurisdictions, leaving some 58 percent of the ocean, the high seas, without any permanent protection. Extending MPA protection to the high seas could bring significant benefits to the goal of increasing biodiversity (White et al, 2014).<sup>2</sup>

MPAs have been established throughout the world's oceans, according to data from the MPAtlas, presented at a March 5, 2015, conference in New York, *One Ocean: Achieving Sustainability through Sanctuaries*.



MPA's are widely distributed throughout the globe (see Figure 2). As of October 16, 2015 six countries stood out as having the largest proportions of their EEZ's in strongly or fully protected marine reserves. These were: Chile (25.3%), United Kingdom (21.9%), United States (15.5%), New Zealand (15.2%), Kiribati (11.9%) and Australia (1.9%) ( Lubchenco and Grorud-Colvert (2015).<sup>3</sup> In late October, 2015, Palau approved the creation of a fully protected marine reserve constituting 80% of it's EEZ, bringing Palau to the top of the list in terms of percentage coverage.

The vast majority of strongly or fully protected marine reserves are in remote areas, which has benefits for biodiversity conservation, but which limits their usefulness in bolstering fish production (subsistence, artisanal and commercial) in areas close to human population centers.

Studies indicate that the greater the level of protection, the greater the benefits. A study of 87 MPAs showed that the level of protection increased exponentially with the presence of 5 key factors (Edgar et al, 2014).<sup>4</sup> The key characteristics that increase MPA effectiveness are:

- 1) no take (ie. fully protected),
- 2) well enforced,
- 3) that they be old,
- 4) large, and
- 5) isolated.

Even MPA's that fall short of these ideal characteristics can show substantial benefits. The Leigh Marine Reserve, established in 1975 in New Zealand, is one of the oldest reserves on the planet. Biodiversity rapidly increased when the reserve was established and densities of lobsters remain 10 times higher within the reserve than outside (Kelly and McDermott, 2003).<sup>5</sup> The reserve also had more healthy kelp forests and fewer urchins than under earlier conditions (Shears and Babcock, 2002).<sup>6</sup>

Following the establishment of an MPA the typical increase in both growth and numbers of fish can be between three to five times within a decade for previously fished species. A reserve in Cabo Pulmo, Mexico, saw an 11 times increase in top predator biomass in 10 years. Animals can spillover from refuges into adjacent fisheries, promoting fisheries and building resilience over large areas.

### How long does it take for the benefits of MPA's to be realized?

While an increase in the number and size of fish can be seen within a few years, it may take decades for full benefits to be realized. Returns on investment in protection are proportional to the size of the investment. The greater the size and the level of protection length of time, the greater the benefits achieved (Lester et al, 2009).<sup>7</sup>

Because of the lag time between MPA establishment and the realization of benefits, there is often a significant transition cost. The transition period must be financed, and ongoing resources for management and monitoring may be needed, especially in poor or developing countries. It is necessary for governments and donors to mitigate the full impacts of these transition costs to their communities.

New research shows that MPAs make good economic sense over the long term. A 2015 study estimated that the total ecosystem service benefits of achieving 10 per cent coverage of MPAs (the SDG 14, Target 5) are estimated to be \$622-923 billion between 2015 and 2050. If there was 30 per cent coverage, the benefits range from \$719 billion to \$1,145 billion over the same period. The economic rates of return range between 9 per cent and 24 per cent. These high rates of return indicate a strong economic case for investment in expanding global coverage of MPAs, in terms of net benefits from increased provision of important ecosystem goods and services. The analysis showed benefits even accounting for the lost fishing opportunities (Brander et al, 2015).<sup>8</sup>

Social scientists have also been studying the impacts of MPAs on communities and fisheries, setting the stage for an evolving field of marine reserve science, addressing the questions of how the people and the existing political structures can accommodate MPAs (Gaines et al, 2010).<sup>9</sup> The establishment of MPAs offers opportunities to revitalize the relationships between communities and stakeholders. Stakeholder involvement in the process is essential to the outcome. Participants must consider not only their objectives, but also the ecology and the goals of the MPA. An excellent plan must be coupled with governance that can and will carry out the plan. Some fishery management programs are making changes outside the marine reserves to achieve more sustainable fisheries.

Since the establishment of the first marine reserves in the 1970s, scientists are finding that fully protected MPAs, with strong enforcement, almost always achieve their primary goal of significant ecological gains, including more species, more of them, and in larger sizes. Networks of reserves that extend from shallow into deeper waters can protect more biodiversity, since many species move among habitats during their life cycles. These connected networks can protect species while allowing some extractive use between reserves (Grorud-Colvert et al. 2014).<sup>10</sup>

A key concept of the philosophy of MPAs is that they should represent a diverse selection of habitats. Plans must be crafted within existing governance arrangements, fishery resources, and with ecological considerations such as larval dispersion. There must be a plan to sustain fishers while stocks are rebuilding. MPAs should not be an end in themselves, but a means of achieving objectives.

The establishment of MPAs also recognizes there are other values besides fishing. These include biodiversity conservation, maintaining ecosystem integrity, tourism; wild oceans/parks, and the scientific knowledge that comes from monitoring control sites. Globally, more than 98% of the ocean is open to fishing. Yet, the importance of non-fishing objectives is growing. In some cases the value of leaving fish in the water exceeds that of extracting them. Manta rays, for example, generate \$15,000,000 in ecotourism, while their fished value is \$442,00 (O'Malley et al, 2013). Both biodiversity conservation and sustained fisheries are very high priorities. The Belize Barrier Reef is a World Heritage Site, because of its high biodiversity. Every MPA is zoned to include a managed fishing zone to provide adjacent community benefits.

## The Challenges Ahead

The best plans, the best intentions, and the best governance are not sufficient. There must be enforcement, observation, policing, prosecution of violators, and heavy fines. High tech solutions are needed, such as satellite monitoring that may be more cost effective than the old – patrol and apprehend methods. We must harness technologies created for military purposes for the enforcement of MPA laws.

Monitoring is also crucial. We need to be able to measure progress (or lack thereof) so that we know the impact we're having and have the opportunity to make adjustments.

There are also financial obstacles to creating MPAs. For MPAs to realize their full benefits, there needs to be a plan for them to become financially self-sustaining over time. MPAs can be attractive to tourists, and a portion of fishing revenues can support MPA activities. Blue carbon is another possibility and other innovative ideas are being discussed.

The science has documented the benefits that can come from MPAs. The best practices to optimize success have been identified. The challenge in making 10 x 20 a reality will be in the

implementation and governance arenas, making enforcement strong and cost-effective, financing the transition, and creating plans to make sure that the MPAs become self-sustaining financially over the long haul.

Feb. 24, 2016

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<sup>1</sup> Lubchenco, J., K. Grorud-Colvert, *Science*, 350 (6259) (2015).

<sup>2</sup> White, C., C. Costello, *PLOS Biol.* 12, e1001826 (2014).

<sup>3</sup> Lubchenco and Grorud-Colvert, Supplementary material ([www.sciencemag.org/cgi/content/full/science.aad5443/DC1](http://www.sciencemag.org/cgi/content/full/science.aad5443/DC1)).

<sup>4</sup> Edgar, G *et al.* *Nature* 506: 216-220, (2014)

<sup>5</sup> Kelly, S. and A. B. MacDiarmid. Movement patterns of mature spiny lobsters, *Jasus edwardsii*, from a marine reserve. *New Zealand Journal of Marine and Freshwater Research*. 37:149-158, (2003)

<sup>6</sup> Shears, N. T. and R. C. Babcock. Continuing trophic cascade effects after 25 years of no-take marine reserve protection. *Marine Ecology Progress Series*. 246:1-16, (2003)

<sup>7</sup> Lester, S.E *et al.* *Marine Ecology Progress Series* 384: 33-46 (2009)

<sup>8</sup> Brander, L., Baulcomb, C., van der Lelij, J. A. C., Eppink, F., McVittie, A., Nijsten, L. and P. van Beukering. 2015. *The benefits to people of expanding Marine Protected Areas*. VU University, Amsterdam, The Netherlands.. VU University, Amsterdam, The Netherlands.

<sup>9</sup> Gaines, S. D. *et al.*. Evolving Science of Marine Reserves: New Developments and Emerging Research Frontiers. *Proceedings of the National Academy of Sciences of the United States of America* 107.43: 18251–18255. (2010)

<sup>10</sup> Grorud-Colvert, K., Claudet, J., Tissot, B.N., Caselle, J.E., Carr, M.H., Day, J.C., Friedlander, A.M., Lester, S.E., de Loma, T.L., Malone, D. and W.J. Walsh. 2014. Marine Protected Area Networks: Assessing Whether the Whole Is Greater than the Sum of Its Parts. *PLoS ONE* 9 (8):e102298.