

Marine Protected Areas: A fundamental tool for long-term ocean biodiversity protection and sustainable management

This statement is a response to discussions on the designation of Marine Protected Areas (MPAs) by the Commission for the Conservation of Antarctic Marine Living Resources (CCAMLR), which recently introduced a debate about time-limits for MPA designations. The IUCN defines a protected area as “A clearly defined geographical space, recognized, dedicated and managed, through legal or other effective means, to achieve the long-term conservation of nature with associated ecosystem services and cultural values”.¹

The IUCN World Commission on Protected Areas (IUCN-WCPA)^a underscores two important elements of effective MPA designation and management^a:

- Individual MPAs and MPA networks in their entirety, particularly in areas where ecosystem health is already impacted, or in areas with fragile, slow growing, vulnerable species - such as polar regions - should be long-term permanent commitments; and
- Individual MPAs within permanent MPA networks need appropriate review mechanisms to allow for flexible and adaptive management.

IUCN-WCPA is clear that MPAs should not be used as short-term and temporary management arrangements – to do this ignores global standards, experience and scientific evidence, actually increases administrative costs and burdens, increases uncertainty for sectoral interests, and leaves open opportunities to damage conservation objectives due to individual short term political and economic interests that could take generations to put right, if at all.² Permanency and full protection afforded by MPAs insure against imperfect knowledge and imperfect management responses and decision-making processes.

The suggestion of time limits on such a central matter seems genuinely at odds with the spirit and objectives underlying CCAMLR objectives on MPAs and the responsibility of countries to protect, for example, ‘representative examples of marine ecosystems, biodiversity and habitats at an appropriate scale to maintain their viability and integrity in the long-term’ and to establish ‘scientific reference areas for monitoring natural variability and long-term change or for monitoring the effects of harvesting and other human activities on Antarctic marine living resources and on the ecosystems of which they form part’.³

STATEMENT IUCN-WCPA

MPAs are most effective when they are managed in perpetuity, as the benefits of this long-term protection support ecosystem resilience, including the ability to adapt to climate change, and to monitor trends through the provision of scientific reference data. Time-limits on MPAs would negatively impact these 'investments' that are only properly realised over the long-term. In addition, it has to be ensured that MPAs, within their perpetuity, have an appropriate, flexible and adaptable mechanism which allows to review whether the management measures taken are fulfilling the goals and objectives of the MPAs for which they were designed.



Saving for the Future

Around 2% of the ocean is currently managed through MPA designations. As human pressure on our oceans continues to increase and as the oceans continue to warm and ocean acidification increases, species development and distribution are undergoing significant changes. Under conditions of multiple human induced stressors, planning, design and long-term management of MPAs provide a decision framework for policy-makers and MPA managers to manage cumulative effects.

Numerous benefits have been documented from well-managed areas including:

- Protecting marine biodiversity and habitats;
- Fostering natural ecosystem functioning and age structures in populations, and safeguarding ecosystem services;
- Increasing resilience of the marine environment;
- Halting and possibly reversing the global and local decline in fish populations and productivity by protecting critical breeding, nursery and feeding habitats;
- Economic benefits through tourism, fishing, and broadening economic options;
- Providing opportunities for education, training, heritage and culture; and
- Providing a 'benchmark' for impacts of human activities in other marine areas and providing as sites for reference in long-term research.⁴

Permanent MPAs that are properly managed for their conservation objective(s) have proven to be effective in making long-term informed decisions with respect to the sustainable management of human activities such as tourism, shipping and fishing. The establishment of MPAs as long-term measures with periodic review are already established. **Marine reserve legislation in New Zealand** does not provide for unconditional expiry after a specified period of time.⁵ The 2005 MPA Policy recognises the importance of the long-

term nature of MPAs and the need to review management measures:

[It] represents a long-term investment in the marine environment with the expectation that benefits will arise over time. It therefore makes sense to work towards long-term protection. Nevertheless, it may be necessary to adjust the design and/or location of some MPAs in light of changing environmental conditions, improving knowledge and changes in the use of the marine environment.⁶

Similarly, the main objective of the **Great Barrier Reef Marine Park Act** is to ‘provide for the long term protection and conservation of the environment, biodiversity and heritage values of the Great Barrier Reef Region’.⁷ The Act underwent a thorough review in 2006, including a review of the objectives. As a ‘regular and reliable means of assessing performance in an accountable and transparent manner’⁸, the long-term protection of the GBRMP will be underpinned by a periodic Outlook Report every five years.

Consequently these MPAs are not established with a time limit, as their objectives need long-term attention. The existence of a review mechanism does not imply that the designation of the MPA itself is being reconsidered, but rather that the results of research and monitoring in the MPA are assessed in light of the original conservation objectives, and possible management measures adjusted as a result.

Long-term return on investment

Investments in MPAs come with a substantial expected return. Protecting 20-30% of the ocean can be expected to increase the sustainability of the \$70 - \$80 billion per year fishing industry, help to maintain key ecosystem services that have been estimated to yield up to \$6.7 trillion per year, and decrease the amount of money that is currently required for fishing subsidies.⁹ Indeed, it has been suggested that the value of marine reserves (due to enhanced adjacent fishing and tourism) may often exceed the pre-reserve value, and that economic benefits can offset the costs in as little as five years.¹⁰

Permanent MPA networks magnify the benefits of individual sites and protect the large-scale processes that maintain healthy populations, such as connectivity, gene flow and genetic variation. Protection of critical breeding grounds, nursery and feeding habitats, through MPA designation is also beneficial to fisheries outside the MPA through potential “spill-over” effects.¹¹ Areas where fishing has ceased or been reduced have shown a decrease in fishing mortality and habitat degradation, along with an increase in biomass and species richness. Due to the increased density and size of fish, fish and larvae can “spillover” into surrounding fishing grounds, having tangible benefits for fish harvesters. Given the somewhat lengthy timescales it may take for ecological benefits to accrue within MPA boundaries,¹² fish harvesters may face an initial “opportunity cost” associated with loss of access to certain fishing grounds. Over the long-term, fish harvesters will reap significant benefits. For example, fish harvesters in Kenya

and the Solomon Islands had their incomes double within a decade after the establishment of an MPA, and following the establishment of several MPAs in St. Lucia, catches adjacent to MPA boundaries have increased from 46% to 90% for different gear types.¹³ On average, fish, invertebrates and seaweeds within MPA boundaries were 21% more diverse, 28% larger, density increased by 166%, and biomass increased by 446%.¹⁴

Seasonal protection of certain species or habitats may be a useful component in the management of an MPA, but seasonal closures are not MPAs unto themselves. The time required for ecological benefits to accrue in a MPA can range from a couple years to decades, depending on the scale of previous harm to life history of species, damage to habitat and ecological traits, the extent of progress in developing the MPA network, and effectiveness of management outside the MPAs. In cold-water ecosystems where ecological processes for keystone species can be extremely slow, long-term permanency is an essential requisite rather than optional idea. Representative examples of marine ecosystems, or unique, rare or highly biodiverse habitats and features, will require long-term monitoring and management to truly stay conserved over timescales of human generations.

The Necessity for Review

Regular reviews of MPA management plans and the identification and monitoring of ecological indicators within the MPA are vital to ensure that it continues to achieve the goals for which it was originally designated, especially in times of climate change.¹⁵ Reviews also provide necessary oversight of the implementation of

the management plan, including evaluating whether the plan has been effective.

A review process should, for example, examine the possible negative human impacts on representative systems or rare habitats from changing ocean conditions or human activities, and it should review the MPA delineation and whether further restrictions of human activities and/or expansions to the permanent MPA network are needed. For representative systems to maintain their viability and integrity and to truly stay representative, their long-term management needs to be secured.

The **National Marine Sanctuaries Act** in the United States mandates that ‘at intervals not exceeding five years, the Secretary shall evaluate the substantive progress toward implementing the management plan and goals for the sanctuary [...] and shall revise the management plan and regulations as necessary’.^{16, 17} It is an adaptive management approach that, coupled with ongoing monitoring programs, condition reports, and community input from the Sanctuary Advisory Councils, allows management measures to be revisited, to ensure they are as effective and efficient as possible in protecting sanctuary resources, including changing boundaries, altering/amending/adding regulations, and removing/altering/adding zones, if necessary. The integrity of the sanctuary (i.e., its stability of protection for valuable resources, return on investments of long-term monitoring programs, etc) remains intact, while allowing for continuously updated protection and management measures.

There are other examples of permanent MPAs that include mechanisms for regular review as the norm:

- MPAs designations that occur under the **Convention for the Protection of the Marine Environment of the North East Atlantic, also known as OSPAR** state in the case of the Charlie-Gibbs North Sea High Seas MPA that “the boundaries of the Marine Protected Area in this Decision may be reviewed by the OSPAR Commission”.¹⁸ Additionally, OSPAR has developed guidelines that apply to all MPAs, noting the need for management plans and that the “effectiveness of the management measures will need to be evaluated and the management plan will need to be adapted as necessary and appropriate on a regular basis.”¹⁹

- Antarctic Specially Protected Areas (ASPAs) and Antarctic Specially Managed Areas (ASMA) under the **Antarctic Treaty** can be designated for an indefinite period unless the Management Plan provides otherwise.²⁰ Currently all ASMAs and the vast majority of ASPAs have been designated for an indefinite period. A number of ASMAs and ASPAs have undergone review of their management plans²¹, and this has almost always resulted either in no substantive changes or in a strengthening of the environmental protection provisions of the original management plan.



Conclusion

It is widely recognised and demonstrated that MPAs provide many social, economic and biodiversity benefits and that these benefits increase over time. MPAs should not be viewed as short-term and temporary management arrangements. They need to be established, and managed for permanence – the many reasons for this set out in this paper are heightened further in cold-water regions where damaged ecosystems may take decades to recover if at all. Regular monitoring and review of resource management should be undertaken to allow for flexibility and adaptability to improve decision-making and provide the knowledge to support adaptive management of the permanent MPA network, in line with national legislation and international obligations.

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- ¹ Dudley, N. (ed) (2008) Guidelines for Applying Protected Area Management. Categories. Gland. Switzerland.
- ² Day J., Dudley N., Hockings M., Holmes G., Laffoley D., Stolton S. & S. Wells, 2012. Guidelines for applying the IUCN Protected Area Management Categories to Marine Protected Areas. Gland, Switzerland: IUCN. 36pp.
- ³ CCAMLR Conservation Measure 91-04 (2011) General framework for the establishment of CCAMLR Marine Protected Areas
- ⁴ Toropova, C., Meliane, I., Laffoley, D., Matthews, E. and Spalding, M. (eds.) (2010). Global Ocean Protection: Present Status and Future Possibilities. Brest, France: Agence des aires marines protégées, Gland, Switzerland, Washington, DC and New York, USA: IUCN WCPA, Cambridge, UK : UNEP-WCMC, Arlington, USA: TNC, Tokyo, Japan: UNU, New York, USA: WCS. 96pp.
- ⁵ For example, the New Zealand 1971 Marine Reserves Act provides for management plans and their review but does not provide for the expiry of marine reserves.
- ⁶ <http://www.biodiversity.govt.nz/pdfs/seas/MPA-Policy-and-Implementation-Plan.pdf>
- ⁷ AustralianGovernment.GreatBarrierReefMarineParkAct1975.Canberra, Australia. Available from: [/http://www.comlaw.gov.au/Details/C2012C001095](http://www.comlaw.gov.au/Details/C2012C001095)
- ⁸ Day, J. and Dobbs, K. (2013) Effective governance of a large and complex cross-jurisdictional marine protected area: Australia's Great Barrier Reef. *Marine Policy* 41: 14–24.
- ⁹ Balmford, A., Gravestock, P., Hockley, N., McClean, C.J., and Roberts, C.M. 2004. The worldwide costs of marine protected areas. *Proceedings of the National Academy of Sciences of the United States of America*, 101, 9694-9697.
- ¹⁰ Sala E, Costello C, Dougherty D, Heal G, Kelleher K, et al. (2013) A General Business Model for Marine Reserves. *PLoS ONE* 8(4): e58799. doi:10.1371/journal.pone.0058799.
- ¹¹ Additional references on spill-over effects include:
- Goñi, R., Badalamenti, F. and Tupper, M.H., 2011, Chapter 3: Effects of marine protected areas on local fisheries: evidence from empirical studies, pp 72-98. In: *Marine Protected Areas: Effects, networks and monitoring – A multidisciplinary approach*. J. Claudet (ed). Cambridge University Press, New York. Ecology, Biodiversity and Conservation Series, New York, 377 pp.
 - Halpern, B. S. et al. (2010) Spillover from marine reserves and the replenishment of fished stocks. *Environmental Conservation* 36 (4): 268–276.
 - McClanahan, T. R. and Mangi, S. (2000) Spillover of exploitable fishes from a marine park and its effect on the adjacent fishery. *Ecological Applications* 10:1792–1805.
 - Stobart, B. et al. (2009) Long-term and spillover effects of a marine protected area on an exploited fish community. *MEPS* 384:47-60.
 - Stamoulisa, K. A. and Friedlanderc, A. M. (2012) A seascape approach to investigating fish spillover across a marine protected area boundary in Hawai'i. *Fisheries Research*. In press.
- ¹² Russ, G.R. and Alcala, A.C., 2004, Marine reserves: long-term protection is required for full recovery of predatory fish populations, volume 138, Issue 4, pp 622-627
- ¹³ Roberts, CM., Bohnsack, J.A., Gell, F., Hawkins, J.P., and Goodridge, R. 2001. Effects of marine reserves on adjacent fisheries. *Science*, 294, 1920-1923.;
- Sala, E. 2012. "Declare 20% of the ocean off-limits. Here's one great way to save fish – and the fishing industry". *Harvard Business Review HBR's list of audacious ideas for solving the world's problems*. January – February 2012. Page 5 - 6
- ¹⁴ Partnership for Interdisciplinary Studies of Coastal Oceans. 2007. The science of marine reserves (2nd Edition, International Version). www.piscoweb.org. 22 pages.
- ¹⁵ CEC (2012) Guide for Planners and Managers to Design Resilient Marine Protected Area Networks in a Changing Climate http://www.cec.org/Storage/143/16880_QA12-06-MPA-Guide_en.pdf
- ¹⁶ United States. 2000. National Marine Sanctuaries Act. <http://sanctuaries.noaa.gov/library/national/nmsa.pdf>.
- ¹⁷ See also Moore, E. (2011) National Marine Sanctuary System, USA – governance analysis. Pages 60-64 in PJS Jones, W Qiu and EM De Santo (Eds) *Governing Marine Protected Areas: getting the balance right – Volume 2*. Technical Report to Marine & Coastal Ecosystems Branch, UNEP, Nairobi.



STATEMENT IUCN-WCPA

¹⁸ OSPAR. 2012. Decision 2012/1 on the establishment of the Charlie-Gibbs North High Seas Marine Protected Area.

¹⁹ OSPAR. 2003. Guidelines for the Management of Marine Protected Areas in the OSPAR Maritime Area. Reference Number: 2003-18. Available at http://www.ospar.org/documents/DBASE/DECRECS/Agreements/03-18e_MPA%20management%20guidance.doc.

²⁰ Protocol on Environmental Protection to the Antarctic Treaty Annex V Art. 6 (3)

²¹ The periodic five-years review of management plans for ASPAs and ASMAs is undertaken by a the Subsidiary Group on Management Plans (SGMP), which was established by the Committee for Environmental Protection in its XIth meeting (2008) to review new or revised management plans for ASPAs and ASMAs and to advise the CEP on the improvement of management plans.