MPA News
International News and Analysis on Marine Protected Areas

Vol. 1, No. 4 **December 1999 - January 2000**

How Should We Manage for the Effects of Natural Hazard Events on MPAs?

Marine protected areas are designated mostly for the purpose of protecting coastal and marine resources from human-induced impacts. Nonetheless, natural events can cause just as great, or greater, disturbances to an MPA ecosystem in a day or week than most human activities can. The world's coasts are subject to a wide variety of severe natural hazards — hurricanes, cyclones, tsunamis — and MPAs are not immune from their impact. Natural climate variability, too, can cause significant shifts in species distribution, with die-outs of coral and other organisms.

These natural phenomena are inarguably a part of the ecosystems that MPAs are designed to protect, yet they can abruptly alter those very ecosystems and create real challenges for managers.

In light of the recent impact of Hurricane Lenny on the Soufrière Marine Management Area on St. Lucia (see p. 3), *MPA News* surveyed several experts for their thoughts on the role of natural hazard events and climate variability in MPAs. We also asked how managers could prepare for them.

Role of Natural Events

Natural hazard events are integral to the continual reformation of coastal ecosystems. Alastair Harborne, marine science coordinator for UK-based Coral Cay Conservation, called the effect of such events on coral reefs inevitable.

"In tropical marine ecosystems, research is unequivocal on the importance of hurricane effects as factors that shape reef communities," said Harborne. "Long-term quantitative monitoring programs have documented dramatic changes in many taxa, including corals and algae, following storm events. Indeed, it seems likely that such disturbances maintain the diversity of reefs by providing opportunities for pioneers and poorer competitors."

Such opportunities may also come as a result of climate variability. Janne Kaje, a research associate with the Joint Institute for the Study of Oceans and Atmosphere (JISAO) at the University of Washington (US), said that extreme seasonal to interannual climate events — strong El Niño events, for example — produce adverse conditions for some species while offering brief windows of opportunity to others. "[These events] are akin to natural hazards — like hurricanes and typhoons — in that they represent low-probability, high-impact events with potentially significant consequences for ecosystems," said Kaje, referring to climate variability as a normal, essential component of ecosystems.

Kaje said the impacts of climate variability could take any number of forms, including physical habitat destruction (e.g., soft corals and barrier islands); temperature-driven direct mortality (e.g., coral reefs); range movement or range contraction of organisms (e.g., many schooling pelagic fish); or disruption of "normal" patterns of current-driven dispersal (e.g., for larvae of many benthic invertebrates and demersal fish). (next page)

Table of Contents

Note: The staff of *MPA News* is on vacation from the beginning of the new year. This issue covers the months of December 1999 and January 2000. Monthly delivery resumes in February.

Managing for Change

These natural and unpredictable changes in the physical and chemical environment create a moving target for managers charged with protecting coastal and marine ecosystems, said Cliff Robinson, a marine ecologist with Parks Canada. "Coastal ecosystems are continuously evolving and responding to short- and long-term environmental variability," said Robinson. "The challenge facing managers is to understand how human-use activities will impact the ecological integrity — the structure and function — of MPA ecosystems, nested within this background of environmental variability."

Robinson said that managers of Parks Canada's Marine Conservation Areas need to prepare for such variability by developing adaptive strategies that build on monitoring of key ecological components. "Ultimately science has the lead role of assisting managers in developing an understanding of the dynamics of [MPA] ecosystem structure and function over long and short time scales," he said.

JISAO's Kaje added, "Most importantly, managers should embrace the notion that natural hazards and climate variability are essential organizing properties of living systems. Explicit acknowledgment of variability, beginning at the design stages of MPAs, will promote a precautionary management approach that reflects the expectation of change rather than a myopic one of presumed stability."

Kaje said managers could arrange monitoring efforts in order to learn from natural hazard events. While baseline monitoring could be an ongoing activity, for example, predetermined and intensive monitoring plans could be in place for responding to extreme events. Such responsive monitoring could help determine how ecosystems react to environmental changes.

Monitoring

Proactive monitoring is ongoing in Australia, where managers at the Coral Seas National Nature Reserves are keeping a photographic record (aerial and surface) to help reveal impacts related to major storm events on beach and vegetation, according to Leanne Wilks, Assistant Director of Marine Protected Areas for Environment Australia. Tracking of these impacts is important for the management of bird and turtle nesting sites in the reserves. Wilks added that Environment Australia's Solitary Islands Marine Park has proposed to undertake an overall park monitoring program that would include monitoring for the effects of ocean warming.

Two of the three offices of the Hawaiian Islands Humpback Whale National Marine Sanctuary (US) lie within a tsunami inundation zone. Superintendent Allen Tom has prepared for potential disasters by creating an evacuation plan for volunteers and staff, and being ready to relay tsunami information to the surrounding community. In terms of minimizing damage to natural resources from hazard events, said Tom, the sanctuary could do such things as set mooring pins and construct breakwaters in areas prone to wave damage. "These are natural events, though," he said, "and I'm not sure it is our job as managers to try and prevent them."

Knowledge of the ecosystem's health is the most important part of preparing for a natural hazard event, said Kerim ben Mustapha, a coral scientist with the Institut National des Sciences et Technologies de la Mer (INSTM) in Tunis, Tunisia. "By understanding the biodiversity of the MPA and the functioning mechanisms of its protected ecosystems, the MPA manager will be able to predict how much a natural event may damage these ecosystems," he said. He added that the creation of buffer areas around MPAs, for the study of ecosystem functions and mechanisms beyond the boundaries of the MPA, were essential to such understanding.

Healthy Ecosystems Are More Resilient

Anthropogenic impacts on MPAs have the effect of decreasing ecosystem resiliency to natural change, said several experts. "The interesting question is the degree to which we have affected the ability of reefs to recover," said Coral Cay Conservation's Harborne. "For example, if there has been damage to areas of reefs which supply coral or fish larvae, this will have a significant effect on recruitment to communities recovering from natural events."

Harborne said MPA managers could mitigate the effects of natural hazards by maintaining a healthy ecosystem. "Research is still lacking," he said, "but it seems intuitive that a balanced, stress-free area will recover more quickly and 'naturally' than an area affected by poor water quality, sed- imentation, and over-fishing. Managers cannot change the path of hurricanes, but if their [MPA] is in good health and part of a network linked by larval recruitment, then they have a much better chance of long-term success."

Creating more and bigger MPAs, and linking them, might also offer greater resilience from nature's hazards. Said JISAO's Kaje, "A sufficiently large and diverse network of MPAs can provide protection for essential ecosystem components and processes that will buffer species and communities against extreme events and [climate] shifts."

Added Hawaii's Tom, "[Larger MPAs] would be good for the habitat's and ecosystem's sake as well."

For more information: Alastair Harborne, Coral Cay Conservation, 154 Clapham Park Road, London, SW4 7DE, UK. Tel: +44-(0)171-498-6248; E-mail: arh@coralcay.org; WWW: www.coralcay.org. Janne Kaje, University of Washington, Box 354235, JISAO/SMA Climate Impacts Group, 4909 25th Ave. N.E., Seattle, WA 98195, USA. Tel: +1 206 616 5349; E-mail: jkaje@u.washington.edu. Cliff Robinson, Ecosystem Services, Parks Canada Agency, 300 - 300 West Georgia St., Vancouver, BC V6B 6B4, Canada. Tel: +1 604 666 2374; E-mail: cliff_robinson@pch.gc.ca. Leanne Wilks, Marine Group, Environment Australia, GPO Box 787, Canberra ACT 2601, Australia. Tel: +61 2 6274 1767; E-mail: Leanne.Wilks@ea.gov.au. Allen Tom, Hawaiian Islands Humpback Whale NMS, 726 South Kihei Road, Kihei, HI 96753, USA. Tel: +1 808 879 2818; E-mail: allen.tom@noaa.gov. Kerim ben Mustapha, Institut National des Sciences et Technologies de la Mer (INSTM), 2025 Salammbô, Tunis, Tunisia. Tel: +216 1 730 420; Fax: +216 1 732 622; E-mail: karim.benmustapha@instm.rnrt.tn.

Hurricane Waves Level MPA Noted for Conservation Effectiveness

Storm waves of 30 feet (9 meters) in height destroyed as much as 80% of the coral cover in some areas of the Soufrière Marine Management Area (SMMA) off the Caribbean island of St. Lucia on November 17. The SMMA, profiled in a 1997 *Coral Reefs* (16:150) article for one of its reserves' remarkable enhancement of fish biomass, has now lost much of its marine life, according to early damage assessments.

SMMA Manager Kai Wulf said his staff has conducted daily dive assessments since the storm waves, which had been triggered by Hurricane Lenny but were not accompanied by abnormal wind or rain. Divers have attempted to repair coral damage where possible, including by re-attaching pieces.

"I don't know where the fish have gone," said Wulf. "Of the surrounding islands' MPAs, we appear to have been hit the hardest."

The waves were unexpected. Not only had locals anticipated that the worst of hurricane season was already over by the time the waves hit, but it was the first time in recorded history that a hurricane had sent such storm waves along this path. "We were absolutely unprepared for it," said Wulf.

Lost facilities, lost revenue

The waves wiped out shoreline buildings of the town of Soufrière, causing an estimated EC $8-9 million (US $3-3.3 million) in damage and destroying the SMMA's new office, completed in October. Damage to the SMMA's infrastructure has been estimated at EC $600,000 (US $220,000).

The SMMA may now be in danger of losing much of its revenue base, according to Wulf, who said that management depended in large part on revenue from diving. "The storm will have a big impact on the dive industry," he said.

Making the situation more difficult, fishermen — many of whose homes were destroyed by the waves — have requested that the SMMA's reserves be re-opened to fishing, due to the industry's hardship. SMMA managers have been working with local fishermen for years to encourage fishing in deeper waters, off the reefs.

"We lost all around with this storm," said Wulf.

Recovery?

The deeper areas of the SMMA were not hit as hard by the waves, and the beaches — though currently barren of sand — should recover soon. "We're not too worried about the beaches," said Wulf. "The sand will come back eventually."

As for a full recovery of the ecosystem, Wulf said he expected not to see one. "Certainly not in my lifetime," he said. "But we'll do what we can with what we have."

In their 1997 *Coral Reefs* article, Callum Roberts and Julie Hawkins of the University of York (UK) reported that in one small reserve within the SMMA, the total biomass of commercially important species was more than double that in nearby non-reserve areas with similar habitat. The tiny 2.6-hectare (6.5 acre) reserve was home to, among other species, three large and easily caught species seen nowhere else along the heavily fished coast.

For more information: Kai Wulf, Soufrière Marine Management Area, P.O. Box 305, 3 Bay Street, Soufrière, St. Lucia, West Indies. Tel: +1 758 459 5500; E-mail: smma@candw.lc; Web site: www.smma.org.lc.

MPA News Publisher: Bradford Powers, J.D., L.L.M. Editor-in-Chief: John B. Davis

Editorial Board:

Chair: David Fluharty, Ph.D.
School of Marine Affairs
University of Washington

Patrick Christie, Ph.D.
School of Marine Affairs
University of Washington

Michael Murray
Channel Islands National
Marine Sanctuary

Project Aims to Network North American MPAs

Representatives from Canada, Mexico, and the US met in November to discuss plans for a project to improve information exchange and build conservation capacity among marine protected areas in the three countries. Called the North American MPA Network, the project is intended to link these nations' MPAs electronically via the World-Wide Web (WWW) and develop cross-cutting conservation initiatives among MPA sites.

The North American MPA Network will allow MPAs to benefit from coordinated conservation efforts, sharing of lessons learned, and increased access to information on emerging threats, novel management strategies, and funding or outreach activities.

The project meeting, held November 14-16 in La Paz, Baja California Sur, Mexico, involved fifteen representatives from each of the three nations. Participants included representatives from government agencies, academic and research institutions, NGOs, and the private sector (ecotourism industry). "We developed the bare bones of a plan to further international cooperation around MPAs in North America," said meeting facilitator Julia Gardner of Dovetail Consulting. "This plan will be elaborated in the near future."

Action plan

The project was formed under the auspices of the Commission on Environmental Cooperation (CEC), an organization established by Canada, Mexico, and the US in 1994 to address transboundary environmental concerns in the context of increasing trade under the North American Free Trade Agreement. The CEC is providing the seed funding (US $100,000) to develop cooperative conservation initiatives and establish the WWW-based MPA network in the coming year.

The meeting results, including an action plan, will be posted on the CEC web site in Spring 2000. According to the CEC, the project action plan could include such activities as establishing regional pilot projects and developing common standards for evaluating MPA effectiveness. "The next big step right now is getting the action plan done," said the CEC's Martha Rosas, who headed the meeting's tri-national steering committee.

In coming years, project leaders intend to initiate a gap analysis of North America's marine and coastal areas to identify priorities for coastal and marine conservation on the continent.

Additional information on the North American MPA Network project — including a background paper on MPAs in North America, with a review of initiatives and issues — is available on the CEC web site at http://www.cec.org/english/profile/coop/Biodive_g.cfm?format=2.

For more information: Hans Herrmann (project coordinator), Commission for Environmental Cooperation, Conservation and Biodiversity Division, 393, St-Jacques Street West, Suite 2000, Montreal, Quebec H2Y 1N9, Canada. Tel: +1 514 350 4340; Fax: +1 514 350 4314; E-mail: hherrman@ccemtl.org; Web site: www.cec.org. Julia Gardner, Dovetail Consulting, Inc., 105-2590 Granville St., Vancouver, BC V6H 3H1, Canada. Tel: +1 604 878 1148; E-mail: jgardner@interchange.ubc.ca.

Conference Calendar

14-17 February 2000 — Pacific Grove, California, US. "International Pelagic Shark Workshop." Hosted by Ocean Wildlife Campaign, a coalition of six conservation groups. Web site: www.audubon.org/campaign/lo/ow.

6-9 March 2000 — Melbourne, Victoria, Australia. "Coast to Coast 2000: Beyond the Beach." Organized by Victorian Coastal Council, Environment Australia, and others. Web site: www.vcc.vic.gov.au.

9-12 July 2000 — Portland, Oregon, US. "The Coastal Society 17th International Conference: Coasts at the Millennium." Organized by The Coastal Society. Web site: www.oce.orst.edu/mrm/tcs17/confhome.html.

30 July - 2 August 2000 — Halifax, Nova Scotia, Canada. "First International Symposium on Deep Sea Corals: Science and Conservation of Deep Sea Corals." E-mail: coral@is.dal.ca.

MPA Nomenclature: The Thicket of Terms and Definitions Continues to Grow

What's in a name? Perhaps more than you bargained for, if you're in the field of MPAs. With practitioners seeming each month to cook up new terms for particular types of marine protected areas, staying up-to-date on the ever-expanding MPA dictionary has become somewhat challenging. Even at *MPA News* we sometimes can't remember the difference between a marine reserve, marine life reserve, and ecological reserve (or are they all the same...?).

To some extent, political prudence has driven the flourishing of terms describing MPAs. Several MPA experts, for example, have created new terms for "no-take zone" in an effort to put the idea of fish stock recovery in a more positive light for stakeholders, who are often fishermen. Rather than use a term with a potentially negative connotation like "no-take zone", the manager might use a term like "fish replenishment area", which focuses on the idea of rebuilding fish stocks instead of decreasing short-term harvests.

However, some critics have suggested that the growing thicket of terminology may be counterproductive to resource protection. Without a common understanding — and, ideally, a legal basis — for what these terms mean, they may end up meaning nothing, or everything. A marine protected area, sanctuary, or park established with no formal definition of these terms could in reality have no protection.

Does consistency in terminology matter? We at *MPA News* think it's a worthy goal. So, following the lead of the Australian government, which is embroiled in developing a nationally consistent nomenclature for marine protected areas by 2001, *MPA News* initiates a discussion of MPA terminology:

The IUCN Basics

"Marine protected area" is used as a catch-all term: a no-take zone is a marine protected area, but a marine protected area is not necessarily a no-take zone. Definitions from the IUCN (World Conservation Union) for "protected area" and "marine protected area" are used commonly throughout the world to describe MPAs:

Protected Area (IUCN 1994): "An area of land and/or sea especially dedicated to the protection and maintenance of biological diversity, and of natural and associated cultural resources, and managed through legal or other effective means."

Marine Protected Area (IUCN 1992): "An area of intertidal or subtidal terrain, together with its overlying water and associated flora, fauna, historical and cultural features, which has been reserved by law or other effective means to protect part or all of the enclosed environment."

The IUCN also defines six general categories of protected area management:

Ia. Strict Nature Reserve: protected area managed only for science
Ib. Wilderness Area: protected area managed mainly for wilderness protection
II. National Park: protected area managed mainly for ecosystem protection and recreation
III. Natural Monument: protected area managed mainly for conservation of specific natural features
IV. Habitat/Species Management Area: protected area managed mainly for conservation through management intervention
V. Protected Landscape/Seascape: protected area managed mainly for landscape/seascape conservation and recreation
VI. Managed Resource Protected Area: protected area managed mainly for the sustainable use of natural ecosystems

---

Nat'l Definitions of MPA

Regulators of MPAs have adapted the IUCN definitions to their particular circumstances. Here are three national definitions of MPA and one state-level definition:

Australia: Australian Conservation Agencies use the IUCN definition for Protected Area (above) as the basis for their definition of MPA. Notably, in establishing its National Representative System of MPAs, Australia has elected to distinguish MPA from other "marine managed areas" — such as exclusive economic zones — in that an MPA is established especially for the conservation of biodiversity and can be classified according to at least one of the six IUCN categories.

Canada: Under the Oceans Act, a marine protected area "is an area of the sea that forms part of the

(next page)

internal waters of Canada, the territorial sea of Canada or the exclusive economic zone of Canada and has been designated for special protection...." The purposes given for such protection all relate to conservation and protection, such as of fisheries, endangered species, unique habitats, high biodiversity, high productivity, or other marine resources or habitats.

US: The US has no official definition for Marine Protected Area. Its National Marine Sanctuaries, however, are codified as: "[A]reas in the ocean from the shore to the edge of the continental shelf and in the Great Lakes that are distinctive for their conservation, recreational, ecological or esthetic values...." US law declares that the federal government will "preserve and restore such areas by designating them as marine sanctuaries and providing appropriate regulation and management."

California (US): In its Marine Life Protection Act, signed into law in October (*MPA News* 1:3,1), the State of California defined MPA as: "A named, discrete geographic marine or estuarine area seaward of the high tide line or the mouth of a coastal river, including any area of intertidal or subtidal terrain, together with its overlying water and associated flora and fauna that has been designated by law, administrative action, or voter initiative to protect or conserve marine life and habitat."

Terms that have appeared in *MPA News*

Listed here are MPAs that have appeared in recent issues of *MPA News* (with volume, issue, and page number, and location of use), with their protective use restrictions:

Ecological Reserve (1:1,1, Florida Keys, US) = All extractive activities prohibited.

Highly Protected Zone (1:1,4, Macquarie Island, Australia) = All extractive activities prohibited.

Species/Habitat Management Zone (1:1,4, Macquarie Island, Australia) = Mining prohibited but some commercial fishing allowed.

Fish Replenishment Area (1:1,5, Hawaii, US) = Aquarium fish collecting prohibited.

Marine Sanctuary (1:2,5, Washington, US) = Oil drilling prohibited but commercial fishing allowed.

Marine Life Reserve (1:3,1, California, US) = All extractive activities prohibited.

International Peace Park [proposed] (1:3,3, US/Canada) = All extractive activities prohibited.

Marine Sanctuary (1:3,5, Apo Island, Philippines) = All extractive activities prohibited.

There is little agreement on terms for MPAs, and this will likely remain the case as the field continues to grow. At *MPA News*, we will continue to focus attention on new terminology as it arises and keep readers up-to-date on trends in usage.

We would like to hear from you regarding the growth in MPA terminology. Last year, Ben Haskell of the Florida Keys National Marine Sanctuary (US) wrote on the CMPAN internet listserv (reprinted here with his permission): "I'm not sure if consistency in [MPA] nomenclature really matters — there's no consistency on land and the system seems to work. What matters is what the user can or can't do once they arrive at the MPA and whether those regulations are enforced." Do you agree? Please send your ideas to mpanews@u.washington.edu; we look forward to printing replies.

Direct correspondence to: *MPA News*, School of Marine Affairs, University of Washington, 3707 Brooklyn Ave. NE, Seattle, WA 98105, USA. Tel: +1 206 685 2170; Fax: +1 206 543 1417; E-mail: mpanews@u.washington.edu. *MPA News* is produced monthly as an independent study initiative at the School of Marine Affairs, University of Washington. The *MPA News* staff is solely responsible for content.

For a free subscription, send an e-mail message to mpanews@u.washington.edu. Please type "subscribe" on the subject line, and include your name, mailing address, and daytime phone number in the text of the message. Also, please note whether you would like your subscription to be delivered electronically or in paper format. Thank you.