MPA news

International News and Analysis on Marine Protected Areas Vol. 2, No. 7 February 2001

Case Study of a Spill Response: How Galápagos Managers Handled the *Jessica* Spill

Last month, a tanker vessel carrying a cargo of 240,000 gallons (605,000 liters) of fuel ran aground off San Cristobal Island in the Galápagos Islands, Ecuador. After two days, the tanker *Jessica* began to leak, and fuel continued to spill from her for nearly a week. All told, the *Jessica* released two-thirds of her cargo directly into the waters of the archipelago — the Galápagos Marine Reserve.

Galápagos resource managers faced a potential ecological nightmare. But through a combination of manpower, technology, and luck, they appear to have kept the spill from becoming the disaster it could have been. This month, MPA News examines how the Galápagos management team responded to the *Jessica* spill, and what other MPA managers can learn from their experience.

First response

On the night of 16 January, the *Jessica* was on her way to the Galápagos port of Baquerizo Moreno on San Cristobal Island. Her cargo — 80,000 gallons of bunker oil and 160,000 gallons of diesel fuel — was set for delivery to the archipelago. The thick bunker oil was to be used as fuel for a boat tourism company, while the diesel was headed to the islands' main marine fueling station.

The *Jessica*'s captain was reportedly unfamiliar with the waters. When he mistook a buoy for a lighthouse and made a wrong turn, he grounded the vessel about a half-mile (800 meters) off San Cristobal, one of the easternmost of the Galápagos Islands.

On the next morning, 17 January, the Ecuadorian Navy and the director of the Galápagos National Park Service (GNPS) coordinated action to dispense floating barriers, or booms, around the ship to prevent dispersion of the oil in the event of a spill. Waters were calm, and the Navy began efforts to empty the fuel tanks ship-to-ship.

The next day, however, the *Jessica* listed 25 degrees; this, along with mechanical failures on the vessel, caused bunker fuel to start spilling. Over the ensuing days, cracks in the vessel and heavier weather caused the spillage to accelerate. GNPS and the Navy announced their response plan: to contain and deflect the spreading fuel from sensitive areas as best as possible, and engage in extensive monitoring efforts of affected areas by plane, boat, and foot.

Coordination

Detailed updates on the day-to-day efforts of the spill's cleanup and monitoring crews are provided on the website of the Charles Darwin Foundation (*www.darwinfoundation.org*). These efforts included monitoring areas affected by the spill, monitoring potentially threatened areas to establish an ecological baseline, setting up animal rescue centers, and treating affected animals onsite.

All this required extensive coordination on the part of the spill management team. Not only were GNPS and the Navy involved, but so were staff from the islands' Charles Darwin Research Station (CDRS), the International Fund for Animal Welfare (an NGO), and international spill experts. Upon request from the Ecuadorian government, specialized oil spill equipment and response experts from the US Coast Guard and US National Oceanic and Atmospheric Administration were flown to the site. In addition, local volunteers, including fishermen, joined in monitoring and rescuing wildlife.

With the Navy in charge of spill containment, GNPS directed the cleanup. In all, 60 park rangers were involved. "The Park has emergency strategies that are implemented when needed," said Desirèe Cruz, a GNPS spokesperson. "We count on excellent teamwork, with well-trained people eager to work non-scheduled shifts."

Paola Diaz, a spokesperson for CDRS, said the management team worked well. "The Charles Darwin Research Station is always prepared to coordinate activities with [GNPS]," she said. "In this case, we worked jointly following the Park's guidelines. After the coordinators for each activity were established, the response flowed with no problems."

continued on page 2

Table of Contents

Oil spill

continued from page 1

The team's hard work was considerably enhanced by favorable weather. Currents and winds eventually pushed the fuel west and north, away from San Cristobal and into deeper waters. Although some of the slick reached the islands of Santa Fe and Santa Cruz, only small numbers of seabirds and sea lions appear to have been affected. Intense sunshine sped up evaporation of the diesel fuel.

Robert Bensted-Smith, director of CDRS, said on 23 January that preliminary assessments indicated the impacts of the oil spill on the Galápagos ecosystem would not be severe. "If we are right...then this will be a great relief to everyone," he wrote in a published report. "However, relief should not lead us to neglect the need for a great deal of mitigation, ecological monitoring, disaster prevention, and contingency planning, for which Ecuador will need international assistance."

Role of computers in the response

Computer technology played a significant and varied role in the management team's response to the spill. To anticipate the projected movement of the oil slick, the management team used a geographic information system (GIS) to analyze drift-buoy data from the last 20 years. Complementing this, regular aerial surveys collected data on the position of the slick, and these data were entered into the GIS database. Managers used these data to determine the best areas to set up wildlife rescue stations.

Websites played a key part in keeping stakeholders around the world informed of the spill and response. The website of the Ecuador-based Charles Darwin Foundation (CDF), which operates CDRS, offered a wide range of detailed and timely information.

Perhaps the most valuable website for spill managers, however, was the site for Charles Darwin Foundation, Inc. (CDF, Inc.), the US-based fundraising arm for CDF, CDRS, and GNPS. The site — www.galapagos.org — not only offered daily spill update information, but also provided a way for web visitors to assist the response. A page on the site enabled visitors to donate money directly to the spill response efforts using a credit card. It also provided CDF, Inc.'s address and phone number for use as an alternate donation route.

Erica Buck, media and outreach director for CDF, Inc., said the public response to the spill was overwhelming. "The CDF, Inc. website normally gets 400-1000 visitor accesses per day," said Buck. "On one day during the spill, we had over 20,000 accesses." She estimates that CDF, Inc. raised tens of thousands of US dollars through the site, all of which went directly to Galápagos to support response efforts. Putting up the oil spill donation page was the result of quick thinking and communications, said Buck. "When the spill occurred, we talked with [CDRS] and asked them what their needs were."

For more information:

Desirèe Cruz, Galápagos National Park Service, Isla Santa Cruz, Galápagos Islands, Ecuador. E-mail: *infopng@fcdarwin.org.ec*.

Paola Diaz, Charles Darwin Research Station, Isla Santa Cruz, Galápagos Islands, Ecuador. Tel: +593 5 527 013; E-mail: *infocdrs@fcdarwin.org.ec*; Web: *www.darwinfoundation.org*.

Erica Buck, Charles Darwin Foundation, Inc., 100 North Washington Street, Suite 232, Falls Church, VA 22046, USA. Tel: +1 703 538 6833; E-mail: *info@galapagos.org*; Web: *www.galapagos.org*.

Tips on Oil Spill Response Planning

Dagmar Schmidt Etkin, an oil spill analyst for Environmental Research Consulting (US), has been studying impacts of oil spills for 12 years. She has provided oil spill data analysis for the US Coast Guard, Environment Canada, the World Bank, and the International Maritime Organization, as well as numerous other agencies and industry organizations. Etkin offered these tips to MPA News on how to plan effectively for responding to oil spills near MPAs. MPA managers may need to work cooperatively with other entities to implement this advice.

Prevention:

"The importance of preventing oil spills may seem obvious, but it can't be emphasized enough. Even the most successful cleanups don't remove all the oil from a spill area.

"What you want to focus on is prevention of the incidents that cause the largest types of spills: groundings, collisions between vessels, and allisions [between a moving vessel and a stationary vessel]. These can be prevented through the availability and use of accurate navigational tools and charts, proper training of crews and captains, and the use of pilots in difficult passages."

Planning:

"It is important to map out the vulnerable natural areas that would be most impacted by a spill: once you determine these, you can start planning your response strategy. There are a number of technologies that you can use in a spill response, including booms to deflect oil and chemical dispersants to break oil down. Your choice of technology depends on the areas you want to protect.

"In some countries, like the UK, chemical dispersants are the primary response strategy for oil spills, and they can be effective. However, dispersants shouldn't be used everywhere. They can damage the roots of mangroves, and can be toxic to coral; using booms to deflect oil may be a better option in such ecosystems. Also, dispersants are most effective if used in the first

few hours of a spill, before the oil becomes weathered. If you are considering using dispersants as a strategy, explain this beforehand to local stakeholders. The idea of adding additional chemicals to the environment after a spill can be controversial; securing community support ahead of time will enable a quick response when a spill occurs.

"Another strategy is to burn the oil. This has been used effectively in the Arctic. Although burning can result in a substantial amount of thick, black smoke, as much as 98% of the oil can be removed this way. In some cases, however, doing nothing is the most appropriate response. A high-energy beach may be restored to its pre-spill state more quickly by wave action than by human efforts.

"Once you've decided on your technologies, establish a clear chain of command for managing the response."

Response:

"Expect for things to go wrong during a response. Even in the US, where there's a lot of funding for response equipment and there's an emphasis on contingency planning, spill managers still end up having to improvise to some extent.

"With this in mind, the people in charge of responding to a spill need to be skilled managers who can react quickly to unforeseen events. These managers should also be able to deal with cost issues, because costs can add up quickly during a spill.

"In developing nations, where budgets for oil spill response may be very limited, I've seen some creative and effective measures used to control spills. Bales of hay, used as booms, have worked well to deflect spills from sensitive areas. On oiled beaches, once the big blobs of oil have been removed, I've heard of managers raking the sand to aerate it — providing oxygen for naturally occurring oil-eating bacteria. Some managers have applied camel dung to oiled beaches to provide nutrients for those same bacteria."

For more information:

Dagmar Schmidt Etkin, Environmental Research Consulting, 750 Main Street, Winchester, MA 01890, USA. Tel: +1 781 721 6795; E-mail: *etkin@environmental-research.com*; Web: *www.environmental-research.com*.

More Help on Oil Spill Response Planning

The United Nations Environment Programme's Regional Seas Programme (*www.unep.org/unep/program/natres/water/regseas/regseas.htm*) has set up several regional cooperatives to help countries aid one another on various issues, including oil spill response.

The World Bank (*www.worldbank.org /html/extdr/extme/2050.htm*) and the Asian Development Bank (*www.adb.org*) are funding oil spill experts to teach locals in certain vulnerable areas how to use available resources to plan effectively for oil spills.

The International Petroleum Industry Environmental Conservation Association (*www.ipieca.org*) offers education and training programs on spill response in various parts of the world.

The International Maritime Organization (*www.imo.org*) offers courses on oil spill response planning through its World Maritime University (*www.wmu.se*).

US Launches Institute for MPA Training

The US National Oceanic and Atmospheric Administration (NOAA) has created a new center to equip MPA stakeholders with skills for designing and managing marine protected areas. The Institute for Marine Protected Area Training and Technical Assistance will develop and provide a variety of training and assistance to MPA managers, scientists, fishermen, and other interested parties, primarily from the US. It will be located at NOAA's Coastal Services Center in Charleston, South Carolina.

The institute's establishment follows former President Clinton's executive order from May 2000 that ordered NOAA to establish a new Marine Protected Areas Center to provide the science, tools and strategies for building a national system of MPAs (MPA News 1:8). Part of NOAA's response has been to create two regional MPA centers: the above-mentioned MPA training institute in South Carolina, and the Center for Marine Protected Areas Science in Santa Cruz, California (MPA News 2:5).

NOAA invites inquiries from students and professionals interested in collaborating with the institute's staff and its partners. More information on the institute and the national MPA Center in general is available on a new website, "Marine Protected Areas of the United States", co-managed by the US Department of Commerce and Department of the Interior. The website's address is *http://mpa.gov*.

For more information:

Roger Griffis, National Oceanic and Atmospheric Administration, 14th and Constitution Ave. NW, Washington, DC 20230, USA. Tel: +1 202 482 5034; E-mail: *roger.b.griffis@noaa.gov*.

Is Your MPA Effective?: New Report Offers Ways to Assess Management

The number of marine protected areas is growing worldwide. But how effective is each in meeting its objectives? A new report from the World Conservation Union (IUCN) offers a method for evaluating the successes and shortfalls of individual protected areas and protected area systems.

Evaluating Effectiveness: A Framework for Assessing the Management of Protected Areas, published in October 2000, is an evaluation workbook for protected-area stakeholders. Providing step-by-step advice, the report is designed to be used at a variety of assessment levels, from relatively quick evaluations at a national level to detailed monitoring programs at each site.

The report guides readers through decisions about how thorough an assessment should be, what indicators should be used, how the framework may be applied at different scales, and who should carry out the assessment. It is designed for both marine and terrestrial protected areas.

"First and foremost, evaluation should be seen as a normal part of the process of management," says the report. "Evaluation helps management to adapt and improve through a learning process." By learning, managers can ensure that money and other resources are not wasted on programs that are not achieving objectives.

Adaptable to local conditions

The report's framework arose from discussions within the IUCN World Commission on Protected Areas, whose Management Effectiveness Task Force conducted pilot studies for three years prior to the report's publication. Marc Hockings, a co-chair of the task force, authored the report with Sue Stolton and Nigel Dudley of Equilibrium Consultants (UK).

The authors arranged the report in two main sections. The first explains the theoretical and methodological aspects of the framework. The second section contains case studies to demonstrate a range of evaluative approaches for protected areas around the world. Included in the report is a checklist for evaluators to use in ranking their protected areas on 19 issues, including enforcement, communications, economic benefits to local communities, and regional development.

The framework is designed to be adapted to local conditions. Although the above-mentioned checklist has been implemented at a number of protected areas (namely terrestrial sites in Africa and Australia), Hockings said he wouldn't want to see it applied without modification in every circumstance. "Rather, it can be a starting point for working with site managers, local communities, and other stakeholders to develop a more locally relevant assessment instrument," he said.

Likewise, while the framework was designed to work for both terrestrial and marine protected areas, Hockings said its elements need to be fitted to the biome. "For example, the nature of threats to protected areas differ substantially between marine and terrestrial areas," said Hockings. "The greater connectivity within marine systems means that translocated impacts will be more significant and the threat analysis will have to be sensitive to this."

Resistance to evaluation

Still a relatively new tool for protected areas, performance evaluation has encountered some resistance from managers, concerned that the tool will be used primarily to watch and punish them for inadequate performance. It is just as important, said Hockings, for the tool to be used to identify what is going well.

"The major beneficiaries of [evaluation] systems should be the managers themselves," he said. "The results of such assessments should help them do their jobs better, demonstrate the need for more resources where these are needed, and assist in developing a more open dialogue and partnership with local communities and other stakeholders."

For more information:

Marc Hockings, School of Natural Rural Systems Management, The University of Queensland, Gatton, QLD 4343, Australia. Tel: +61 7 5460 1140; E-mail: *hockings@uqg.uq.edu.au*.

Sue Stolton, Equilibrium Consultants, 23 Bath Buildings, Bristol, BS6 5PT, UK. Tel: +44 117 942 8674. Email: *equilibrium@compuserve.com*

Report Is Available for Free Online

Evaluating Effectiveness: A Framework for Assessing the Management of Protected Areas is available to be downloaded for free from the IUCN website, at http://*wcpa.iucn.org/pubs/publications.html*.

MPA Perspective: The Development and Establishment of Coral Reef Marine Protected Areas

By Graeme Kelleher, Director, Graeme Kelleher and Associates. Written: December 2000.

[Editor's note: Graeme Kelleher has been at the forefront of MPA science and policy since the 1970s. From 1979 to 1994, he served as chairman and chief executive of the Great Barrier Reef Marine Park Authority; he is now a senior advisor to the IUCN World Commission on Protected Areas. He has edited and authored landmark publications on MPAs, including IUCN's *Guidelines for Establishing Marine Protected Areas* (1992). In the following essay for MPA News, he offers his perspective on lessons learned from his years in the MPA field.]

For more information:

Graeme Kelleher, 12 Marulda Street, Arenda, Canberra ACT 2614, Australia. Tel: +61 2625 11402; E-mail: *g.kelleher @gbrmpa.gov.au*.

Introduction

"How complex and unexpected are the checks and relations between organic beings, which have to struggle together in the same country." (Charles Darwin, 1882)

Charles Darwin was referring to living organisms. I am quoting him here because the complex, interrelated environmental problems which the world is seeing at the end of the 20th century reveal that his observation is equally applicable to the checks and relations between human political and administrative organizations.

We are at last realizing that everything is connected to everything else and that the world operates as a complex process with characteristics which ensure that it will function chaotically. That is to say, precise predictions of events and states a long time ahead will not be possible.

The best reaction to such a situation is to proceed strategically — that is, to adopt policies that will put us in advantageous positions from which to take specific actions which will contribute to our attaining our objective. Our goal is, of course, ecologically sustainable development.

My aim is to suggest strategies which might contribute to this goal in relation to the establishment and successful management of marine protected areas. In doing so, I shall draw on experience from around the world that demonstrates which approaches usually work and those which usually fail. The ubiquity of these lessons in social and natural sciences and management reflect the apparent commonality of human attributes in all societies.

Lessons from experience

1. The most important attribute of an MPA manager is integrity. Many managers have made the mistake of believing that they can fool some of the people some (or even all) of the time. The consequence of this is that the manager appears to win a series of battles, but he or she loses the war because of the accumulation of loss of trust. This eventually leads to failure.

2. Local people must be deeply involved from the earliest possible stage in any MPA that is to succeed. This involvement should extend to their receiving clearly identifiable benefits from the MPA.

3. Time spent in preparation is an essential investment that will be repaid many times over.

4. Financial sustainability needs to be built in from the beginning.

5. Almost all MPAs contribute to the maintenance or restitution of both biological diversity and abundance, both of which are relevant to sustainable fisheries.

6. It is not feasible in today's marine environment to divorce the questions of resource use and conservation, because marine natural resources and their living space are all sought now by many different users for many different purposes.

7. The tendency in some areas to oppose the recognition of fishery reserves as MPAs seems to be counterproductive, inhibiting cooperation between fishers and environmentalists in creating and managing MPAs.

8. Individual MPAs and systems plans should be designed to serve both sustainable use and environmental protection objectives, and relevant agencies should work together in planning and management. In almost all areas of the world, there has been a long history of conflict and lack of cooperation between environmental and fisheries management agencies. This lack of joint action inhibits progress in establishing MPAs and managing them wherever it is manifest.

9. Socioeconomic considerations usually determine the success or failure of MPAs. In addition to biophysical factors, these considerations should be addressed from the outset in identifying sites for, selecting, and managing MPAs.

10. It is better to have an MPA that is not ideal in an ecological sense but which meets the primary objective than to strive vainly to create the "perfect MPA".

11. It is usually a mistake to postpone action on the establishment of a MPA because biophysical information is incomplete. There will usually be sufficient existing information to indicate whether the MPA is justified ecologically and to set reasonable boundaries.

continued on next page

MPA News

Editor-in-Chief
John B. Davis

Publisher
Bradford Powers, J.D., LL.M.

Editorial Board
Chair
David Fluharty, Ph.D.
School of Marine Affairs
Univ. of Washington

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

Michael Murray
Channel Islands Nat'l Marine Sanctuary

Direct correspondence to: MPA News, School of Marine Affairs, Univ. of Washington, 3707 Brooklyn Ave. NE, Seattle, WA 98105, USA. Tel: +1 206 685 1582; 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, Univ. of Washington. The MPA News staff is solely responsible for content.

This publication was funded in part by Washington Sea Grant Program, Univ. of Washington, pursuant to National Oceanic and Atmospheric Administration Award No. NA76RG0119. The views expressed herein are those of the author(s) and do not necessarily reflect the views of NOAA or any of its sub-agencies.

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.

12. Design and management of MPAs must be both top-down and bottom-up.

13. An MPA must have clearly defined objectives against which its performance is regularly checked, and a monitoring program to assess management effectiveness. Management should be adaptive, meaning that it is periodically reviewed and revised as dictated by the results of monitoring.

14. There is a futile global debate about the relative merits of small, highly protected MPAs and large, multiple use MPAs. Much of this dispute appears to arise from the misconception that it must be one or the other. In fact, nearly all large, multiple use MPAs encapsulate highly protected zones that have been formally established by legislation or other effective means. These zones can function in the same way as individual highly protected MPAs. Conversely, a network of small, highly protected MPAs in a larger area subject to integrated management can be as effective as a large, multiple use MPA.

15. Because of the highly connected nature of the sea, which efficiently transmits substances and forcing factors, an MPA will rarely succeed unless it is embedded in, or is so large that it constitutes, an integrated ecosystem management regime.

Conclusion

The overriding conclusion from case studies of various MPAs around the world is that success or failure is not usually determined by complex factors unique to that particular MPA. On the contrary, they result from failure to apply these fairly simple strategic principles. And it is usually the socioeconomic rather than the biological factors that determine success or failure.

Why do managers fail to apply these simple, well-proven approaches? My conclusion is that it derives from the natural tendency of humans to prefer immediate gratification to long-term benefits. It takes a lot of self-control for a manager to refrain from responding in-kind to insults, or to deliberately raise difficult issues with possible opponents in order to resolve them. It is much easier, and perhaps more "natural", to avoid difficult matters and hope that they go away, or to apply the dictum of "an eye for an eye".

Conference Calendar

February 17, 2001 — "The Scientific Theory of Marine Reserves" and "Melding the Science and Policy of Marine Reserves." San Francisco, California, USA. This pair of symposia will be held during the annual meeting of the American Association for the Advancement of Science. Websites: *www.aaas.org/meetings/2001/6130.00.htm* and *www.aaas.org/meetings/2001/6131.00.htm*.

February 27 - March 4, 2001 — "Expert Workshop on Marine Protected Areas on the High Seas: Scientific Requirements and Legal Aspects." Vilm, Germany. An international, invitation-only gathering to discuss high-seas MPAs, organized by the Federal Agency for Nature Conservation, Germany. Contact: Hjalmar Thiel (*hthiel@awi-bremerhaven.de*).

March 31, 2001 — "Sixth International Wildlife Law Conference: The Seas and International Law." Washington, DC, USA. Web: *www.eelink.net/~asilwildlife/prelim6.html*.

April 16-20, 2001 — "George Wright Society Biennial Conference on Research and Resource Management in Parks and on Public Lands." Denver, Colorado, USA. Conference will focus on parks and protected areas, including themes that deal directly with marine protection issues. Web: *www.georgewright.org/2001.html.*

April 24-27, 2001 — "1st International Congress on Marine Science and Technology." Pontevedra, Spain. The theme of this conference is "Oceanology and Human Development Between the Coastline and the Continental Margin." Web: *www.fomar.org/*.

May 14-15, 2001 — "1st Workshop on Integrated Coastal Zone Management." Santiago de Cuba, Cuba. Co-sponsored by a team of Cuban and Canadian government agencies and academic institutions. Official languages will be English, French, and Spanish. E-mail: *vallejo@mercadu.uo.edu.cu*.

June 18-20, 2001 — "CoastGIS 2001: Managing the Interfaces." Halifax, Nova Scotia, Canada. This is the fourth international symposium on GIS and computer mapping for coastal zone management. Web: *agc.bio.ns.ca/coastgis2001/*.

June 21-26, 2001 — "Second Symposium on Marine Conservation Biology." San Francisco, California, USA. Co-sponsored by the Marine Conservation Biology Institute and the Society for Conservation Biology. E-mail: *juliem@selway.umt.edu.*

July 15-19, 2001 — "Coastal Zone 01." Cleveland, Ohio, USA. The world's largest gathering of coastal resource management professionals. Web: *www.csc.noaa.gov/cz2001/*.