



## INTERNATIONAL COLLABORATION LESSON PLAN

# No Fishing?

### Theme

Protecting Natural and Cultural Resources

### Links to Overview Essays and Resources Needed for Student Research

<http://nos.noaa.gov/topics/oceans/mpa/>

[http://mpa.gov/information\\_tools/education/pdfs/Poster04companion.pdf](http://mpa.gov/information_tools/education/pdfs/Poster04companion.pdf)

and [http://mpa.gov/information\\_tools/education/pdfs/mpaposter\\_activity.pdf](http://mpa.gov/information_tools/education/pdfs/mpaposter_activity.pdf)

See specific citations on “Introduction to Marine Protected Areas Worksheet”

### Subject Area

Life Science

### Grade Level

9-12

### Focus Question

How are marine protected areas used in various countries to protect natural and cultural resources?

### Learning Objectives

- Students will be able to identify internet resources containing information on international Marine Protected Area projects.
- Students will be able to describe a process for evaluating the effectiveness of marine protected areas.
- Students will be able to explain the relationships between biophysical, socioeconomic, and governance issues in marine protected areas.

### Materials Needed

- Copies of “Introduction to Marine Protected Areas Worksheet,” one copy for each student or student group

- (optional) Computers with internet access; if students do not have access to the internet, download copies of materials cited under “Learning Procedure” and provide copies of these materials to each student or student group

### Audio/Visual Materials Needed

None

### Teaching Time

One or two 45-minute class periods, plus time for student research

### Seating Arrangement

Classroom-style, or in groups of 3-4 students

### Maximum Number of Students

32

### Key Words

Marine Protected Area  
Conservation  
Cultural Heritage  
Natural Heritage  
Sustainable Production  
Biophysical indicator  
Socioeconomic indicator  
Governance indicator

### Background Information

Around the world, there is increasing recognition of the importance of marine resources and of the need to protect these resources from natural threats and harmful human activities. Marine protected areas (MPAs) are a popular technique for providing this protection. In addition to protecting marine biodiversity and ecosystems, many countries also expect MPAs to help reduce poverty, and provide for healthier coastal communities with a strong foundation for economic growth. Despite their popularity, MPAs are often constrained by insufficient financial resources, lack of technical expertise, and insufficient natural and social science research. These constraints can be particularly severe in developing countries.

Recognizing these constraints as well as the potential benefits of MPAs, many countries are looking for ways to evaluate how well MPAs achieve their intended purpose and to identify specific actions that will improve the effectiveness of MPAs. To assist MPA evaluations, the World Commission on Protected Areas and World Wide Fund for Nature launched the MPA Management Effectiveness Initiative (MEI) in partnership with the National Ocean Service. A major product of this initiative is a guidebook on how to perform evaluations of MPA effectiveness.

The guidebook is based on measurable biological and physical features (called “biophysical” indicators), ways that the MPA interacts with human communities (“socioeconomic” indicators), and the procedures that are used to run an MPA (“governance” indicators). The first step in the evaluation process is to select the indicators in each category that are relevant to the specific MPA being evaluated. For example, biophysical indicators might include the abundance of key species, water quality, or the amount of damaged area that has been restored; socioeconomic indicators might include local fishermen’s perception of how fish harvests have changed, changes in the health of local human communities, or local knowledge of natural history; governance indicators might include existence of a formal plan for resource use and protection, active community support, availability of necessary human resources and equipment.

To test the guidebook, eighteen MPAs around the world were selected to use evaluation process and make recommendations for improvements. Four MPAs prepared in-depth reports of their experiences that show how the evaluation process can be used. In this lesson, students will explore MPAs around the world, and compare four effectiveness evaluations that illustrate the variety of objectives and approaches that can be used to achieve these objectives in MPAs.

### Learning Procedure

1.

If your students have not completed the “Water Parks” lesson, direct students to “MPA Education Poster Site Descriptions” and “A User’s Guide to Marine Protected Area

Types and Terms“ at [http://mpa.gov/information\\_tools/education/pdfs/Poster04companion.pdf](http://mpa.gov/information_tools/education/pdfs/Poster04companion.pdf) and [http://mpa.gov/what\\_is\\_an\\_mpa/MPA\\_UsersGuide.pdf](http://mpa.gov/what_is_an_mpa/MPA_UsersGuide.pdf). Have each student complete one version of the MPA Subject Review, then lead a discussion to review the answers. Be sure students understand the distinctions between “natural heritage,” “cultural heritage,” and “sustainable production” MPAs:

In natural heritage and cultural heritage MPAs, the primary mission is to protect natural and/or cultural resources. Varying types and degrees of human uses may be allowed, but these activities are secondary to the primary purpose of resource protection.

In contrast, allowing certain uses as well as protecting resources are both part of the primary purpose of sustainable production MPAs. These MPAs allow resources to be used, as long as the resources can also be maintained and conserved. For example, in an area where local fishing has traditionally provided an important food supply to coastal communities a sustainable production MPA might allow local fishermen to continue to use fishery resources, but might limit fishing by non-residents. Or, in an area where recreational fishing by visitors is important to the local economy, a sustainable production MPA might allow recreational uses to continue as long as fishery resources are not depleted. A common misconception is that protected areas are synonymous with severely restricted use, but this is not true of many MPAs.

## 2.

Have each student or student group complete the “Introduction to International Marine Protected Areas” worksheet. Lead a discussion of students’ answers to the questions on the worksheet.

Students should be able to infer from the regional map linked to the Cartier Island Marine Reserve (CIMR) site ([www.deh.gov.au/coasts/mpa/cartier/maps/regional.html](http://www.deh.gov.au/coasts/mpa/cartier/maps/regional.html)) that the location of Cartier Reef in the Indian Ocean could make it easier for some plants and animals to travel between the reefs of Indonesia, Australia, and the Philippines, and thus serve as a “biological stepping stone” between these reefs. While Cartier Reef has been used for centuries by Indonesian fishermen and

more recently as a military practice range, waters within the Reserve are now closed to all activity except scientific research (and that requires a special permit). This is an example of a strictly conservation-only type of MPA, intended to protect seriously depleted or threatened resources.

In contrast, the Red Sea Marine Peace Park (RSMPP) is directed toward tourism, which brings thousands of visitors to the Park every year. This is an example of an MPA in which political objectives (the desire to demonstrate mutually beneficial cooperative activity between Israel and Jordan) were at least as significant as conservation objectives. Conservation is still a prominent theme within the Park, however, as reefs in this part of the Gulf of Aqaba are potentially threatened by poor water circulation.

The Mesoamerican Barrier Reef System Project is distinctly different from the CIMR and RSMPP, in that sustainable use by indigenous populations is a primary goal. A joint venture of Mexico, Belize, Guatemala, and Honduras, this Project includes the second-largest barrier reef in the world. As of April 2004, 15 MPAs had been identified for inclusion in the Project (students will need to locate the MBRSP project document dated April 2004 referenced on the “Information Center” page linked to the MBRSP home page at [http://www.mbrs.org.bz/english/en\\_index.htm](http://www.mbrs.org.bz/english/en_index.htm)).

Four main cultures are represented within the MBRSP:

- Creoles of African descent living in Belize and Honduras;
- Mestizos whose ancestors were indigenous peoples as well as Europeans (mostly Spanish);
- Garifunas descended from Africans and Arahucos from Honduras, Guatemala, and Belize; and
- Maya Q’eqchis and Mopans who originated in Guatemala but now live in Belize.

Coastal resources have been an integral part of these cultures for centuries. The Garifuna and Mayan cultures, for example, use marine plants and coastal vegetation for food, construction materials, handicrafts, pharmaceuticals, cosmetics, and religious purposes. Protecting these uses and cultures is a primary purpose of the MBRSP.

The Cowaramup Reef Protected Area (Australia) is another example of an MPA in which human use is balanced with

conservation objectives. Here, it is permissible to fish with rods or handlines for finfish, or to catch squid, cuttlefish, blue manna crabs, abalone and rock lobsters; but all other marine life is protected, including live sea shells, octopus, starfish, rock crabs, sea urchins, shellfish, coral and algae.

Selecting areas to be included in an MPA usually involves analyzing a combination of scientific, economic, and social data. MARXAN software was developed to help these analyses in the process of designing reserve systems. Information about the MARXAN software can be found on the University of Queensland (Australia) website at <http://www.ecology.uq.edu.au/marxan.htm>

### 3.

Assign one of the following MPAs to each student group:

- Miramere Natural Marine Reserve, Trieste, Italy
- Galapagos Marine Reserve, Ecuador
- Mafia Island Marine Park, Tanzania
- Lenger Island Marine Protected Area, Federated States of Micronesia

Tell students that their assignment is to review the effectiveness evaluation report for their assigned MPA, and prepare a summary of the report that includes:

- A description of the MPA including size and location
- Purpose of the MPA
- Effectiveness indicators selected for the evaluation
- Lessons learned from the evaluation

You may want to suggest that groups assign specific responsibility for these topics to individual students. Effectiveness indicators and lessons learned may be subdivided into biophysical, governance, and socioeconomic components. Direct students to reports for these MPAs at <http://effectivempa.noaa.gov/cases.html>.

### 4.

Have each group present their report to the entire class. Lead a discussion of the results. Key points that should emerge during this discussion include:

- The evaluation process was (and should be) seen as a way to identify opportunities rather than shortcomings. All four sites

found that the evaluation process revealed ways to improve the effectiveness of efforts to protect resources and control ways in which they are used. At Miramere, it became clear that an urban setting required a different approach to some indicators than the approach used for more isolated settings.

- Prior to evaluation, staff at Miramere and Lenger Island focussed primarily on biophysical aspects of the MPAs. Evaluation showed that governance and socioeconomic aspects require a similar level of attention.
- Evaluation of the Galapagos, Mafia Island, and Lenger Island MPAs revealed important gaps in understanding and support among local communities, indicating the need for improved communication and public education efforts. At the same time, the Galapagos evaluation showed that conflicts among different user groups can be reduced by allowing these groups to participate in developing policies and activities within the MPA (a process known as “participatory management or “co-management”).
- Evaluations helped improve biophysical monitoring in the Galapagos MPA by showing that fishery resources need more attention, and in the Lenger Island MPA by focussing the attention of MPA staff on specifically what was being monitored and why.
- Staff at the Galapagos MPA noted an additional benefit that was probably obtained at the other MPAs as well: Evaluation helped provide solid evidence of which issues were most important, and thus helped to focus attention and funding on these issues.

### The BRIDGE Connection

<http://www.vims.edu/bridge> – Click “Ocean Science Topics,” then “Human Activities,” then “Enviro-concerns” for links to entries dealing with pollution, conservation, and sustainability.

### The Me Connection

Have students describe how an effectiveness evaluation process could be applied to an activity in which they are involved, including key indicators that can be measured, and how this process might improve the effectiveness of the activity.

### Extensions

Have students complete the evaluation planned in “The Me Connection.”

### Resources

<http://mpa.gov/> – Web site for the National MPA Center, with definitions, program descriptions, list of MPA sites, virtual library, tools, and links to regional information centers

<http://effectivempa.noaa.gov/> – website of the Marine Protected Area Management Effectiveness Initiative

### National Science Education Standards

#### Content Standard C: Life Science

- Interdependence of organisms

#### Content Standard F: Science in Personal and Social Perspectives

- Natural resources
- Environmental quality
- Science and technology in local, national, and global challenges

### Links to AAAS “Oceans Map” (aka benchmarks)

#### 5D/H3

Human beings are part of the earth’s ecosystems. Human activities can, deliberately or inadvertently, alter the equilibrium in ecosystems.







## Introduction to International Marine Protected Areas Worksheet

The purpose of this worksheet is to introduce you to sources of information about Marine Protected Areas (MPAs) and to some examples of how MPAs are used to manage coastal resources in several countries. Begin by pointing your internet browser to the National Marine Protected Areas Center website at <http://mpa.gov/>. Click on the “Information and Tools” tab, then select the “Web sites” page. Use the links listed under “International” to find answers to the following questions:

1. The Cartier Island Marine Reserve is located in what ocean?

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2. Cartier Reef is considered an important biological stepping stone that links the reefs of what three countries?

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3. Find a map that shows the location of Cartier Reef relative to these three countries. What is the URL (web address) for this map?

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4. What have been the principal uses of Cartier Island during the last sixty years?

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5. What uses are now allowed within the Cartier Island Marine Reserve?

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6. The Red Sea Marine Peace Park is located in which region of the Red Sea?

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7. What countries collaborated in establishing the Red Sea Marine Peace Park (RSMPP)?

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8. What oceanographic characteristic in the RSMPP poses a particular threat to corals?

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9. What economic activity in the RSMPP accounts for the greatest amount of human activity within the Park?

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10. What countries are involved in the Mesoamerican Barrier Reef System Project (MBRSP)?

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11. How does the barrier reef in the MBRSP compare with other barrier reefs worldwide?

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12. How many MPAs are included in the MBRSP as of April 2004?

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13. Within the MBRSP, 43 population groups have been identified, which are derived from what four main cultures?

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14. What uses have the Garifuna and Mayan cultures identified for marine plants and coastal vegetation?

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15. What fishing activity is permitted in the Cowaramup Reef Protected Area?

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16. Where could you find information about the MARXAN software for designing reserve systems?

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