

## RESOURCE LIBRARY | LESSON

# Marine Protected Areas Management

Students read a case study and debate the pros and cons of a Marine Protected Area (MPA) in the region. Then they select a Marine Protected Area and develop and present a management plan for it.

**GRADES**

9 - 12

**SUBJECTS**

*Biology, Earth Science, Oceanography, English Language Arts, Geography, Human Geography, Physical Geography*

**CONTENTS**

2 Activities

## ACTIVITY 1: MARINE PROTECTED AREA: STAKEHOLDER DEBATE | 2 HRS

### DIRECTIONS

**1. Introduce the activity and assign homework.**

Tell students that they will read a case study and complete a notetaking worksheet as a homework assignment. Explain that later in this activity they will debate whether or not the designation of an existing MPA will be extended. During the debate they will advocate for different stakeholder points of view in a town hall format. Distribute a copy of the Case Study: Merritt Island National Wildlife Refuge worksheet and the Case Study Notetaking worksheet to each student and assign them as homework.

## **2. During the next class period, discuss the Merritt Island National Wildlife Refuge case study.**

As a whole class, go over the Case Study Notetaking worksheet. Use the provided Answer Key to address any student questions. Then have students determine the conservation goal of the MPA. Ask students to identify the primary conservation goal(s) of this marine environment from the list below, and back up their selections with valid reasoning.

- Natural Heritage—to protect the area's natural biological communities, habitats, ecosystems and processes, and the ecological services, uses, and values they provide to this and future generations
- Cultural Heritage—to protect, understand, and interpret submerged cultural resources—such as shipwrecks or submerged archaeological sites—that reflect the nation's maritime history and traditional cultural connections to the sea
- Sustainable Production—to support the continued sustainable extraction of renewable living resources—such as fish, shellfish, plants, birds, or mammals—within or outside the MPA by protecting important habitat and spawning, mating, or nursery grounds

## **3. Have students read stakeholder role descriptions and assume the role of a stakeholder.**

Distribute a copy of the Stakeholder Role Descriptions handout to each student. Read aloud the directions. Divide students into small groups. Assign small groups of students one of the twelve stakeholder roles. As they read through the stakeholder role descriptions, tell them to consider their stakeholder's point of view, as well as the points of view of stakeholders who may support or oppose them.

## **4. Have students use the stakeholder roles to brainstorm the pros and cons of extending this MPA.**

Have students discuss the stakeholders whom the designation of a Marine Protected Area might affect. Then ask students to consider how the primary conservation goal(s) impact the stakeholders. Ask them to brainstorm a list of the pros and cons of establishing this MPA. Write students' responses on the board. Elicit responses such as:

- Pros: maintenance or growth of fisheries populations, increased tourism, and improved understanding of marine resources
- Cons: loss of fishing-related jobs, increased cost-of-living

## **5. Have student stakeholder groups prepare for the class debate.**

Explain that these stakeholders have been selected to participate in a town hall-style debate on the pros and cons of establishing this new MPA. The town hall format will allow officials to make an informed decision on the MPA designation. Have students get into their stakeholder groups to discuss what they learned from reading the stakeholder role descriptions. Guide their discussion by having them address the following points:

- Is your stakeholder “for” or “against” extending the MPA? How do you know?
- Which other stakeholders are likely to *oppose* your point of view? Why?
- Which stakeholders are likely to *support* your point of view? Why?

After they have had time for discussion, give each group three index cards and colored markers. Tell groups that they need to do the following to prepare for the debate:

- Create a symbol card that represents the point of view of their stakeholder. The symbol will help identify them during the debate and should clearly indicate if they support or oppose the MPA designation.
- Create a support card that lists three points their stakeholder can make to support his/her view. Include a short description of evidence that supports each point.
- Create an oppose card that lists three points other stakeholders can make to oppose their stakeholder’s view. Include a short description of evidence that supports each point. Tell them to clearly indicate which stakeholder would oppose them and why.

## **6. Hold a town hall-style class debate.**

Give each small group two minutes to introduce their stakeholder and make their case for or against the site as a Marine Protected Area from the perspective of their assigned stakeholder. Have them explain their symbol card and how it represents their stakeholder’s point of view. Encourage students to carefully consider both the pros and the cons of this

topic during the debate. After all groups have presented, have a 15-20 minute open question and answer session. Require each small group to use their support and oppose cards to make their points and challenge the arguments of the other stakeholders.

### **7. Have students work to come to a consensus on the MPA designation.**

Explain to the class that they need to work together to make a joint decision on how best to proceed with the Merritt Island National Wildlife Refuge MPA designation. Their goal is to get all stakeholders to understand the MPA designation plan and come to a consensus about how to modify and/or implement the plan. Allow approximately 15 minutes for a consensus-building discussion led by students. Allow students to take on any stakeholder perspective that they choose for this conversation; however, guide the discussion to keep students on track and consistent with their chosen point of view. Make sure students understand that they may not reach full consensus, as it is often not possible to get buy-in from all stakeholders. Tell students that, if necessary, they may need to compromise and develop a range of possibilities and locations for the MPA, resulting in a MPA everybody can live with and benefit from. As a final step, instruct students to develop a consensus statement that summarizes the agreement they have come to regarding the MPA designation plan.

## Informal Assessment

Have each student list three pros and three cons for establishing no-take zone Marine Protected Areas. Ask them to back up their list with evidence.

## Extending the Learning

Have each student write a letter to their local government official that defends their stakeholder's position and describes how to move forward on this MPA designation in a way that meets the needs of as many stakeholders as possible.

## OBJECTIVES

## Subjects & Disciplines

**Biology**

**Earth Science**

- [Oceanography](#)

- English Language Arts
- **Geography**
  - Human Geography
  - Physical Geography

# Learning Objectives

Students will:

- describe the pros and cons of establishing a new MPA site
- identify stakeholders in the MPA designation process
- assume a stakeholder's position and engage in a discussion to support or oppose an MPA designation plan
- describe the impacts of establishing Marine Protected Areas from different stakeholder perspectives

# Teaching Approach

- Learning-for-use

# Teaching Methods

- Brainstorming
- Cooperative learning
- Discussions
- Reading
- Role playing

# Skills Summary

This activity targets the following skills:

- 21st Century Student Outcomes
  - Learning and Innovation Skills
    - Communication and Collaboration

- Critical Thinking and Problem Solving
- 21st Century Themes
  - Global Awareness
- Critical Thinking Skills
  - Analyzing
  - Understanding
- Geographic Skills
  - Analyzing Geographic Information
  - Answering Geographic Questions
  - Asking Geographic Questions

# National Standards, Principles, and Practices

## IRA/NCTE STANDARDS FOR THE ENGLISH LANGUAGE ARTS

- **Standard 12:**

Students use spoken, written, and visual language to accomplish their own purposes (e.g., for learning, enjoyment, persuasion, and the exchange of information).

## NATIONAL COUNCIL FOR SOCIAL STUDIES CURRICULUM STANDARDS

- **Theme 3:**

People, Places, and Environments

## NATIONAL GEOGRAPHY STANDARDS

- **Standard 14:**

How human actions modify the physical environment

- **Standard 16:**

The changes that occur in the meaning, use, distribution, and importance of resources

## NATIONAL SCIENCE EDUCATION STANDARDS

- **(9-12) Standard F-3:**

Natural resources

- **(9-12) Standard F-5:**

Natural and human-induced hazards

- **(9-12) Standard F-6:**

Science and technology in local, national, and global challenges

## OCEAN LITERACY ESSENTIAL PRINCIPLES AND FUNDAMENTAL CONCEPTS

- **Principle 5c:**

Some major groups are found exclusively in the ocean. The diversity of major groups of organisms is much greater in the ocean than on land.

- **Principle 5d:**

Ocean biology provides many unique examples of life cycles, adaptations and important relationships among organisms (such as symbiosis, predator-prey dynamics and energy transfer) that do not occur on land.

- **Principle 5e:**

The ocean is three-dimensional, offering vast living space and diverse habitats from the surface through the water column to the seafloor. Most of the living space on Earth is in the ocean.

- **Principle 5f:**

Ocean habitats are defined by environmental factors. Due to interactions of abiotic factors such as salinity, temperature, oxygen, pH, light, nutrients, pressure, substrate and circulation, ocean life is not evenly distributed temporally or spatially, i.e., it is “patchy”. Some regions of the ocean support more diverse and abundant life than anywhere on Earth, while much of the ocean is considered a desert.

- **Principle 5h:**

Tides, waves and predation cause vertical zonation patterns along the shore, influencing the distribution and diversity of organisms.

- **Principle 6b:**

From the ocean we get foods, medicines, and mineral and energy resources. In addition, it provides jobs, supports our nation’s economy, serves as a highway for transportation of goods and people, and plays a role in national security.

- **Principle 6c:**

The ocean is a source of inspiration, recreation, rejuvenation and discovery. It is also an important element in the heritage of many cultures.

- **Principle 6d:**

Much of the world’s population lives in coastal areas.

- **Principle 6e:**

Humans affect the ocean in a variety of ways. Laws, regulations and resource management affect what is taken out and put into the ocean. Human development and activity leads to pollution (such as point source, non-point source, and noise pollution) and physical modifications (such as changes to beaches, shores and rivers). In addition, humans have removed most of the large vertebrates from the ocean.

• **Principle 6g:**

Everyone is responsible for caring for the ocean. The ocean sustains life on Earth and humans must live in ways that sustain the ocean. Individual and collective actions are needed to effectively manage ocean resources for all.

## PREPARATION

## BACKGROUND & VOCABULARY

### Background Information

Marine Protected Areas are used to protect vulnerable habitats and species, increase biodiversity, prevent overfishing, aid in scientific research, and conserve cultural and natural resources for future generations. Fully protected marine reserves, or no-take zones, like the Merritt Island National Wildlife Refuge, offer the highest level of protection. No harvesting of any kind is allowed in no-take zones, and they show greater abundance, biological diversity, and sizes of fish than non-protected waters. Successful planning and designation of MPAs depends on cooperative stewardship and the involvement of all affected stakeholders.

### Prior Knowledge

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### Recommended Prior Activities

- [Marine Protected Areas](#)
- [Marine Protected Areas: Case Studies](#)
- [MPA Designation and Management](#)

### Vocabulary

Term	Part of Speech	Definition
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Term	Part of Speech	Definition
bioprospecting	<i>noun</i>	process by which pharmaceutical companies buy or claim genetic resources from native species of a developing country.
marine protected area (MPA)	<i>noun</i>	area of the ocean where a government has placed limits on human activity.
marine reserve	<i>noun</i>	part of the ocean where no fishing, hunting, drilling, or other development is allowed.
no-take zone	<i>noun</i>	area set aside by the government where all extractive activity, including fishing, mining, and drilling, is not allowed.
spillover effect	<i>noun</i>	process by which fish are protected within a no-take zone, then produce more offspring and eventually migrate into nearby, unprotected areas.
stakeholder	<i>noun</i>	person or organization that has an interest or investment in a place, situation or company.

## FUNDER

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## ACTIVITY 2: MPA DESIGNATION PROJECT | 10 HRS

### DIRECTIONS

#### 1. Introduce the MPA problem scenarios and project-based learning challenge.

Use the MPA Management Plan Case Study Vocabulary List to pre-teach the vocabulary. Distribute copies of the Gulf of Castellammare Fishery Reserve and Arctic Fishery problem scenarios, as well as the Problem Scenario Notetaking worksheet. Read aloud the directions and the problem scenario challenge for the activity from the notetaking worksheet. Remind students of the work they did in prior MPA, case study, and stakeholder activities in this unit. Tell them that they will need to use all of the content and strategies they learned to be successful in justifying the creation of the MPA and developing an effective management plan. Explain that successful MPAs require well-designed management plans that address important species monitoring, MPA effectiveness, enforcement and compliance, public communication, outreach and long-term education, and analysis of the social and economic

costs and benefits. For homework, have students read the two problem scenarios and complete the notetaking worksheet.

**2. During the next class period, discuss the MPA problem scenarios and the completed notetaking worksheets.**

Divide students into pairs. Have pairs exchange their completed notetaking worksheets and discuss the information that they recorded in their comparison charts. Instruct them to add important information that they discovered during their discussion. As a whole class, discuss the similarities and differences between the two MPA problem scenarios. Address any questions that students may have.

**3. Have students select one of the MPA problem scenarios to explore in depth.**

Tell students that they need to decide as a class which MPA problem scenario they will focus on for their project challenge. Set a time limit for discussion and explain to them that they will need to come to a consensus. Once the class has selected its MPA problem scenario, tell students they are going to work in small groups to gather information that will help them justify the designation of the MPA and develop an effective management plan. Explain to students that after each small group has developed its management plan component, they will regroup as a class to compile the components into one, comprehensive site management plan and present the plan to a fictitious MPA stakeholder approval committee.

**4. Have students work in small groups to develop the five components of the management plan.**

Divide the class into five small groups and assign each group a component from the following list:

- Group 1: List of Biodiversity and Species Monitoring Plan
- Group 2: Management Overview and Site Specific Goals
- Group 3: Social and Economic Impacts
- Group 4: Compliance and Enforcement
- Group 5: Education and Outreach Strategies

Distribute a copy of the Management Plan Components handout to each student. Read the directions aloud, including the problem scenario challenge. Allow students time to read through all of the management plan components. Address any questions they may have. Then distribute a copy of the Project Evaluation Criteria rubric and explain that this criteria will be used to evaluate students' work. Remind them that as a class, they must accomplish two primary objectives:

- Justify the creation and designation of the MPA
- Develop and present an effective management proposal for the MPA

Provide groups with butcher paper, colored markers, and poster board. Some groups will need to collaborate and share information. Facilitate groups in sharing their work as needed. For example, Group 1 should complete its species list first and share it with Group 5 so they can make their food web; Groups 3 and 5 should collaborate on how the MPA may address cultural resource preservation and education; Groups 2 and 4 should collaborate on stakeholder identification, management goals, and compliance/enforcement strategies.

### **5. Discuss and integrate each group's management plan component.**

After small groups have completed the management plans for their assigned components, regroup as a class. Have students compile, discuss, and revise their plans, as needed, so that all of the components together make up one comprehensive management plan that will be used during their final presentation to the MPA stakeholder approval committee.

### **6. Have students use media to develop their formal MPA management plan presentation.**

Explain to students that the next step is for them to turn their MPA proposal and management plan presentation materials into a formal presentation using their media of choice. Examples of presentation formats include presentation software, public service announcements, websites, blogs, e-posters, paper posters, tabletop placards, brochures, songs, or educational games/activities. Explain that students are playing the critical role of advocates who are "selling" the idea of creating the MPA in order to preserve valuable cultural and ecological resources. The media they use to present their proposal and management plan must be an appropriate format to convey the essential information about their problem scenario MPA. Remind them that their work will be evaluated based on the project evaluation criteria: quality, organization and clarity, creativity, evidence of science content learning, and effort exhibited.

### **7. Have students present their proposed management plan to the "MPA stakeholder approval committee."**

Select a day and time for the class to present their MPA proposal and management plan to an audience that represents the MPA stakeholder approval committee. This could be a group of their peers, parents, school administrators, or a public group. Allow 30 minutes for the presentation, with an additional 15 minutes of time for questions and answers. Let the class decide what format they want to use to present the justification for the creation of the MPA and the management plan. Make sure that all students have some role in the presentation

planning and development, including the invitations and promotion of the presentation. Provide copies of the complete management plan and the Project Evaluation Criteria rubric to all presentation attendees.

## Peer Evaluation

Use the Project Evaluation Criteria rubric to evaluate student projects. Distribute the rubric to the audience representing the stakeholder approval committee and have them evaluate student work. Then, share the evaluations and feedback with students and ask them to respond to the feedback, either verbally or in writing.

## Extending the Learning

Have students use the same problem scenario format and criteria to develop and present a proposed management plan for a nearby protected area. The protected area chosen can already be designated as a protected area or one that students want to newly designate. Set up an audience and forum for students to share their work with their peers, parents, school administrators, or a public group.

## OBJECTIVES

## Subjects & Disciplines

### Earth Science

- [Oceanography](#)
- English Language Arts

### Geography

- [Human Geography](#)
- [Physical Geography](#)

## Learning Objectives

Students will:

- analyze the components of a MPA problem scenario
- justify the designation of a MPA
- collaboratively develop a comprehensive management plan for a proposed MPA

- present a media-based MPA management plan to a (fictitious) stakeholder approval committee

## Teaching Approach

- Learning-for-use
- Project-based learning

## Teaching Methods

- Cooperative learning
- Discussions
- Information organization
- Reading
- Writing

## Skills Summary

This activity targets the following skills:

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  - Global Awareness
- Critical Thinking Skills
  - Analyzing
  - Applying
  - Creating
  - Understanding
- Geographic Skills
  - Analyzing Geographic Information
  - Answering Geographic Questions
  - Asking Geographic Questions

- Organizing Geographic Information

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# PREPARATION

## BACKGROUND & VOCABULARY

### Background Information

Marine Protected Areas are created to protect vulnerable habitats and species, increase biodiversity, prevent overfishing, conserve resources for future generations, and aid in scientific research. Successful MPAs include an enforcement program aimed at obtaining compliance, a coordinated public communication strategy, broad-reaching outreach and long-term education initiatives, and analysis of the social and economic costs and benefits. Successful planning and designation of MPAs depends on cooperative stewardship and the involvement of all affected stakeholders.

### Prior Knowledge

["marine protected areas and their importance in the preservation and management of marine resources"]

### Recommended Prior Activities

- [Marine Protected Areas](#)
- [Marine Protected Areas: Case Studies](#)
- [Marine Protected Areas: Student Case Studies](#)
- [Marine Protected Area: Stakeholder Debate](#)

### Vocabulary

Term	Part of Speech	Definition
marine protected area (MPA)	<i>noun</i>	area of the ocean where a government has placed limits on human activity.

## FUNDER



