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JOURNEY TO  
**THE SOUTH PACIFIC**



IMAX THEATERS



DISCOVER AN EXTRAORDINARY WORLD  
ABOVE AND BELOW THE SEA

IMAX<sup>®</sup>  
AND  
MACGILLIVRAY FREEMAN

# JOURNEY TO THE SOUTH PACIFIC



E D U C A T O R G U I D E



# National Education Standards Alignment Charts

National Science Education Standards Alignment chart	A. Science as Inquiry	B. Physical Science	C. Life Science	D. Earth & Space Science	E. Science & Technology	F. Science in Personal & Social Perspectives	G. History & Nature of Science
1. Get Carried Away in Currents!	x	x					
2. Our Changing Water World	x	x		x		x	
3. Coral's Nighttime Romance	x		x				
4. Getting Schooled by Sharks	x		x			x	
5. Sea Turtle Survivor!	x	x	x		x	x	
6. Underwater Parks	x	x	x	x	x	x	x

National Geography Standards Alignment chart	1. The world in spatial terms	2. Places and regions	3. Physical systems	4. Human systems	5. Environment and society	6. The uses of geography
1. Get Carried Away in Currents!	x	x	x			
2. Our Changing Water World	x	x	x	x	x	x
3. Coral's Nighttime Romance			x			
4. Getting Schooled by Sharks			x		x	
5. Sea Turtle Survivor!		x	x		x	x
6. Underwater Parks				x	x	x

National English Language Arts Standards Alignment chart	4. Adjust their use of spoken, written, and visual language to communicate effectively with a variety of audiences and for different purposes	5. Employ a wide range of strategies as they write and use different process elements appropriately to communicate with different audiences for a variety of purposes	7. Conduct research on issues and interests by generating ideas and questions, and by posing problems. Gather, evaluate, and synthesize data from a variety of sources to communicate their discoveries in ways that suit their purposes and audience	8. Use a variety of technological and informational resources to gather and synthesize information and to create and communicate knowledge.
1. Get Carried Away in Currents!			x	
2. Our Changing Water World			x	
3. Coral's Nighttime Romance				
4. Getting Schooled by Sharks	x	x	x	x
5. Sea Turtle Survivor!				
6. Underwater Parks	x	x	x	x

Ocean Literacy Principles	1. The Earth has one big ocean with many features	2. The ocean and life in the ocean shape the features of Earth	3. The ocean is a major influence on weather and climate	4. The ocean made Earth habitable	5. The ocean supports a great diversity of life and ecosystems	6. The ocean and humans are inextricably interconnected	7. The ocean is largely unexplored
1. Get Carried Away in Currents!	x						
2. Our Changing Water World	x	x	x			x	
3. Coral's Nighttime Romance					x		
4. Getting Schooled by Sharks					x	x	x
5. Sea Turtle Survivor!					x	x	
6. Underwater Parks					x	x	x

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**JOURNEY TO  
THE SOUTH PACIFIC**

E D U C A T O R G U I D E

There is a very special place in the ocean—a beautiful, far-away place that students can discover and explore together in the IMAX<sup>®</sup> film *Journey to the South Pacific*.

This tropical ocean wonderland has been called “the Amazon of the sea” by some, “a cauldron of evolution” or “species factory” by others, and is well known to all marine biologists as “the global epicenter of marine biodiversity.”

This special place is found in the Coral Triangle, an ocean expanse that reaches from the Pacific Ocean to the Indian Ocean, and comprises hundreds of miles of reefs teeming with marine life. The Coral Triangle spans the islands of Indonesia, Malaysia, Papua New Guinea, Timor-Leste, Philippines and the Solomon Islands.

At the very heart of the Coral Triangle lies the Bird’s Head Seascape, an ocean area off the northwestern tip of the Indonesian province of West Papua. The Bird’s Head Seascape encompasses the 1,500 islands of Raja Ampat, where the film takes place.

The Bird’s Head Seascape is the most biodiverse marine ecosystem on Earth. Nearly 600 hard coral species and more than 1,700 kinds of reef fish have so far been documented, and new species are still being discovered. By comparison, the much larger Caribbean Sea has less than 1,000 reef fish species and only 63 hard coral types. Even the Great Barrier Reef, more than twice the size of Bird’s Head Seascape, does not contain as many species of fish and coral. The Bird’s Head Seascape is home to 75% of the world’s coral species, 51% of the world’s 70 types of mangroves, 50% of all sea grass species, and 4 of the 7 sea turtle species nest here.

Located at the convergence of tectonic plates, the Bird’s Head Seascape has been shaped by millions of years of geologic upheaval that has carved out a tremendous diversity of habitats:

current-swept reefs, deep-sheltered bays, open-ocean atolls, barrier reefs, blue-water mangroves, rocky wave-swept reefs, undersea mounts, fast-flowing channels, drop-offs and karst lagoons. Each of these unique habitats attracts their special denizens, making for one massive species list overall, including many species not found anywhere else. Deep trenches between islands channel powerful currents that create upwellings of deep, cold water filled with a nutrient-rich, planktonic broth that feeds and aggregates all kinds of fish.

The Bird’s Head Seascape also benefits from its position at the entrance to the Indonesian

Throughflow, an ocean current that takes the warm, species-rich waters from the Pacific Ocean through the island straits to the eastern Indian Ocean where it mixes with other species, helping amplify biodiversity in both areas. The currents within the

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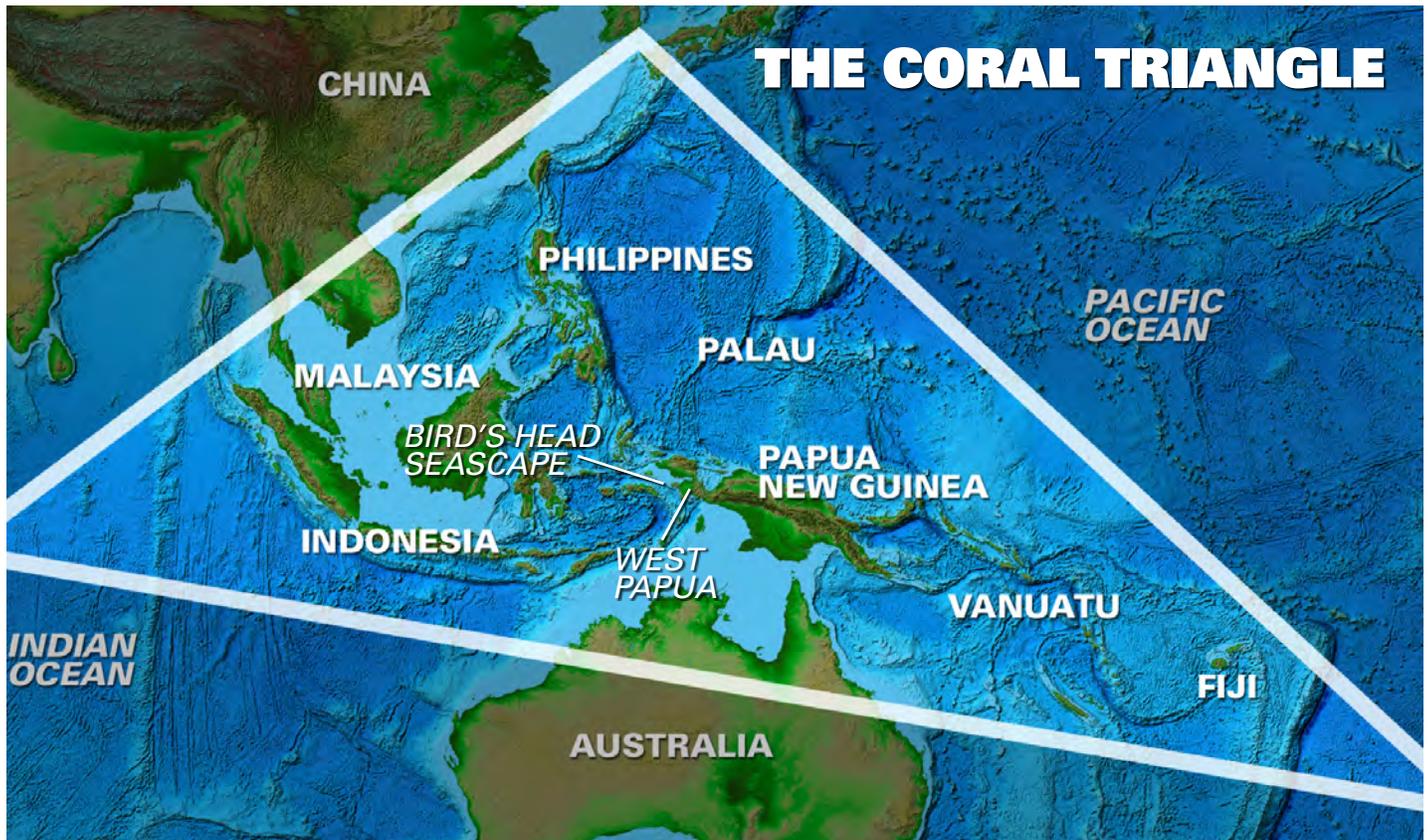
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The *Journey to the South Pacific* Educator Guide, created by MacGillivray Freeman Films in partnership with IMAX Corporation and supported by a generous donation from the One World One Ocean Foundation, is appropriate for all intermediate grades (4-8) and is most useful when used as a companion to the IMAX film, but is also valuable as a resource on its own. Teachers are encouraged to adapt activities included in this guide to meet the specific needs of the grades they teach and their students. Activities developed for this guide support National Education Standards for Science, English Language Arts and Geography and the seven Ocean Literacy Principles.



*The ocean expanse that is the Coral Triangle encompasses the islands of Indonesia, Malaysia, Papua New Guinea, Timor-Leste, Philippines and the Solomon Islands. This special region comprises hundreds of miles of coral reefs teeming with marine life. At the heart of the Coral Triangle is the Bird's Head Seascape, considered the global epicenter of marine biodiversity.*

Bird's Head Seascape therefore have the effect of feeding, aggregating and then dispersing fish, coral and other marine larvae to areas beyond it. Scientists are just beginning to explore the connectivity of the Bird's Head Seascape to reefs and marine areas near and far.

The area's incredible biodiversity and vast marine resources make it both a global conservation priority as well as a target for large and small fisheries and other types of economic development, some of which have proven harmful to the marine environment. Conservation groups and scientists have been partnering with the people of these remote islands and their governments to establish Marine Protected Areas (MPAs)—national parks of the seas.

In *Journey to the South Pacific*, we meet a 13-year-old islander, Jawi, on board the educational vessel *Kalabia* as he learns the diverse ways that communities throughout the Bird's Head Seascape are protecting their precious coral reefs for now and future generations. In the film, we hear Jawi's father explain that for islanders like Jawi,

the sea is “in their blood.” Their lives are tied to the ocean in every way, not only as a source of food, but for transportation, inspiration and recreation. They are as comfortable below the water as above it, and their very health depends on the health of the surrounding reefs.

These islanders know from first-hand experience that this abundance of ocean life also makes it the most vulnerable. They have seen large predator fish such as sharks and mantas disappear due to shark finning and overfishing, and reefs they love turn into barren wastelands from dynamiting or cyanide exposure for the lucrative live fish trade. Some estimates indicate that more than 80% of the reefs in the Coral Triangle are at high risk, and it is the islanders who feel the urgency to find ways to save them.

Jawi and his friends spend their days on and in the ocean, heeding the lessons from Jawi's father about respecting nature like their ancestors have always done, while learning modern day ocean science from teachers on the *Kalabia*. This ship, once used by poachers, has become



Scenes from the IMAX film *Journey to the South Pacific*: (clockwise from top left): Islanders greet the educators aboard the *Kalabia* as they arrive to teach the importance of healthy reefs; a giant manta ray glides over coral reefs thousands of years old; a green sea turtle, whose diet includes corals and toxic sponges; the children of these remote islands are learning how to protect their local reefs; a colorful marine fish finds protection on the reef.

a vibrantly painted floating classroom, filled with creative and energized ocean teachers like Jawi’s Uncle Menas. The *Kalabia* regularly visits the island villages in the Bird’s Head Seascape and is always welcomed with ceremonious singing and dancing by all the villagers, from the tiniest of toddlers to the elders. In the film, Jawi joins the teachers on a *Kalabia* expedition to areas near his home in Raja Ampat as well as throughout the Bird’s Head Seascape.

Jawi discovers that his ancestors’ practice of limiting fish catches has now been expanded to the creation of MPAs, which allow space and time for ecosystem recovery. Through the creation of a network of MPAs and No-Take Zones, West Papuan fishermen are reporting that there are now more large fish, a higher quantity of fish and a return of species formerly depleted. Today, the fishermen and other community members patrol the boundaries of the MPAs to ensure that regulations are enforced, including the new bans on shark finning and manta ray fishing.

Some of Jawi’s most profound lessons come from below the water as he encounters the largest fish in the sea, the gentle whale shark. Initially extremely fearful of this huge creature with the gaping, sucking mouth, his fear changes to awe and appreciation as he swims among a resident population of a dozen young whale sharks in magical Cenderawasih Bay. Jawi also encounters a 500-pound Pacific leatherback turtle as she deposits her clutch of 60-100 eggs in the sands of a West Papua beach. He is amazed that this magnificent and critically endangered creature could travel from her birth beach at West Papua to the coast of northern California for foraging, only to make the 6,000-mile trip back years later to lay her eggs.

The visually compelling stories in *Journey to the South Pacific* immerse audiences in ocean life at its best and reveal our human connection to the world’s reefs, which nourish all sea life. We are all children of the reef.

Welcome to the South Pacific.

# GET CARRIED AWAY IN CURRENTS!

## OBJECTIVE

Students will observe how islands impact current flow and how wind shapes surface currents.

## IN THE FILM

In *Journey to the South Pacific*, Jawi travels throughout the islands of West Papua aboard the *Kalabia*, a floating classroom that visits each of the region's villages teaching islanders more about their local reefs. The strong currents in this region have a significant impact on travel

## KEY WORDS

**Current**—An area of water moving within a larger area of water.

**Upwelling**—Through winds and Earth's rotation, deep ocean currents bring cold, nutrient-rich water to the surface.

**Plankton**—A drifting organism that is mainly transported through the ocean by floating in currents.

**Coral Triangle**—The global center of marine biodiversity is a 6-million-square-km area spanning Indonesia, Malaysia, the Philippines, Papua New Guinea, Timor Leste and the Solomon Islands.

### Bird's Head Seascape—

A marine wonderland of 2,500 islands located off the northwestern tip of the West Papua province. It is considered a "species factory" because of the high level of "endemism" or high number of reef fishes and other fauna known only from this area.

**Raja Ampat**—An archipelago of 1,500 islands within the Bird's Head Seascape at the heart of the Coral Triangle.

throughout the islands as well as on the sea life. Strong currents impact migrating animals and transport nutrients throughout the water column and region. In the film, we learn how the current flows around the islands and how these land masses create narrow channels that large bodies of water squeeze through, increasing the speed of the current.

## BACKGROUND

Wind plays a major role in the creation of surface currents and movement of deep-water currents. As wind blows across the ocean it can drag or move surface water, creating a current. Once this water is moved, water from below

rises to replace it, causing an upward movement of water called upwelling. Water rising from the ocean depths is colder and filled with nutrients, acting as a fertilizer for shallow ocean ecosystems. Because of their unique position at the entrance of the Indonesian Throughflow, a strong current that washes back and forth between the Pacific and Indian Oceans, the islands of Raja Ampat are thought to function as an unparalleled source of larvae that helps feed reefs throughout the region.

## MATERIALS

- Shallow pan or plastic container
- Food coloring
- Dropper
- Water
- Tall rock or glass bowl (cannot be covered by water in pan)
- Short rock or small glass bowl (must be covered by water in pan)
- Paper towels

## TEACHER PREP NOTES

Each student group needs one of each of the materials listed so quantity of materials is dependent upon number of groups. Students will sketch and write their observations and reflections so it is recommended they have designated pages in a science journal. A minimum of one page is recommended for each of the three lessons outlined below.

## ACTIVITY

- 1** Divide the students into groups. Have one student pick up materials.
- 2** Fill the shallow pan with water and let it settle.

## PART I

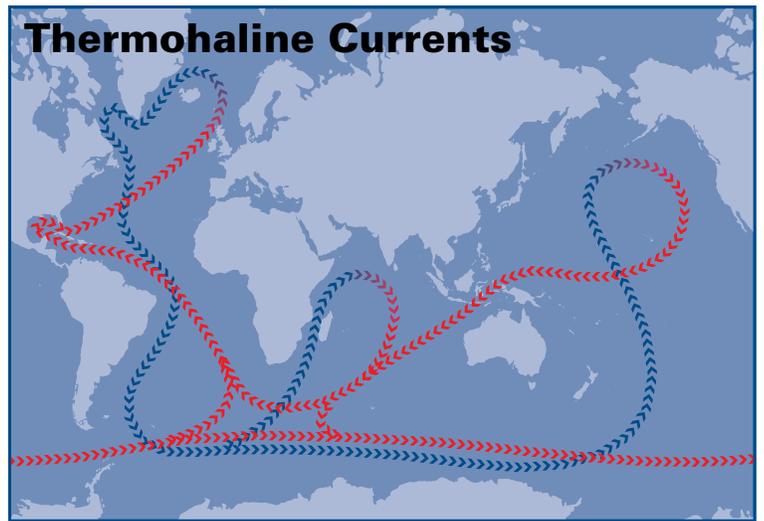
- 3** Place a drop of food coloring at one end of the container and gently blow with varying strength across the water.
- 4** Ask students the following prompts for their science journal:
  - Draw a picture of what happened at the surface and on the bottom of the container.
  - Where did the water current move the fastest?
  - What happened to the water current as it moved away from the wind source (where you were blowing on the water)? What happened as the "strength" of the wind changed?
  - What is the difference between waves generated by wind versus currents generated by wind?

## PART II

- 5 Place a tall rock in the center of the container to simulate an island.
- 6 Place a drop of food coloring at one end, just off the island, and blow across the water.
- 7 Ask students the following prompts for their science journal:
  - Draw a picture and describe what happened in the front of, and on the back of, the island.
  - What happened to the current when it hit against the side of the island?
  - Where is the strongest current found? Explain.

## PART III

- 8 Remove the tall rock and replace it with a petri dish or short rock on the bottom of the container to simulate a submerged island (also known as a “bank”).
- 9 Add food coloring and blow across the water. (To show the difference between shallow and deep water currents, food coloring can be planted at the bottom as well as the top of the water column with different colors.)
- 10 Ask students the following prompts for their science journal:
  - Draw a picture and describe what happened to the food coloring (current). Describe the difference between the shallow and deep-water currents.
  - What is the difference between the island and the submerged bank in terms of the water current?
  - Many organisms in the sea have offspring that begin life as plankton. How might plankton be helped or hindered by these currents?

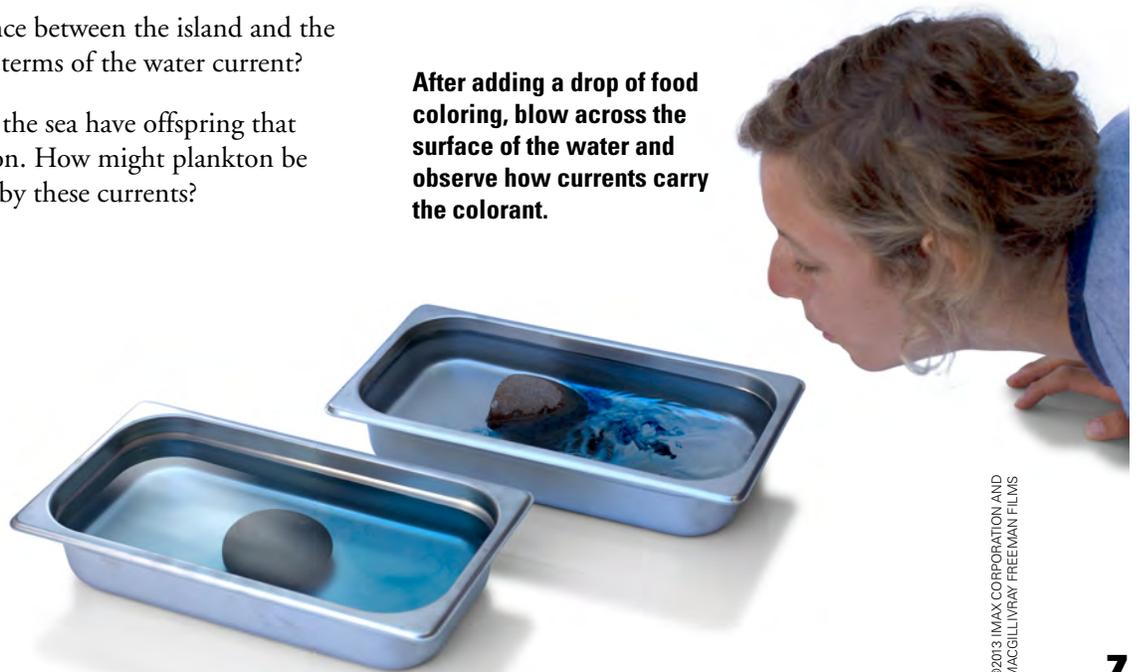


*Thermo (heat) and haline (salt) impacts the density of water. The rising and sinking of large volumes of ocean water drives a global conveyor belt of currents, creating one large ocean.*

- How are bottom currents different from surface currents?
- What are the environmental causes of currents?
- How do currents affect plankton? How would currents affect larger animals?

*This activity is modified from Climate and Currents: A Curriculum in Marine Sciences by University of California, Los Angeles, Marine Science Center.*

**After adding a drop of food coloring, blow across the surface of the water and observe how currents carry the colorant.**



# OUR CHANGING WATER WORLD

## OBJECTIVE

Students will learn the concept of sea level rise by observing one of the contributing factors such as land ice melt. They will also learn that due to displacement, floating ice that melts in the ocean will not contribute to sea level rise.

## KEY WORDS

**Displacement**—The forced relocation of water due to a submerged or partially submerged object occupying fluid space.

**Elevation**—The height above a fixed geographic point, such as sea level.

**Erosion**—A natural process where rock and soil are weathered down and removed from one surface to another. Erosion can be caused by wind and water. An example of erosion is the process of large rocks upstream being ground down and carried to the ocean as finer rock and sand.

**Greenhouse gases**—Gases in Earth's atmosphere that absorb and re-radiate heat near the surface of the planet. Carbon dioxide (CO<sub>2</sub>) is one of the greenhouse gases and is found naturally in the atmosphere but is also released by human activity such as burning coal.

**Climate Change**—The long-term and pronounced changes in a region's climate. The term often refers to the changes that are being accelerated by man-made activities that contribute to the rise of greenhouse gases.

Through discussion, students will explore the impact of sea level rise on coastal communities, human populations and sea life.

## IN THE FILM

We learn that some of the islands in Raja Ampat have extremely low elevations—one island's highest point of elevation is only 6 feet above the waterline. This very low elevation level is a constant source of worry for this island community since any sea level rise or extreme fluctuation of tides can cause extensive damage. In addition to the threat of a rising sea, islanders are concerned about erosion of their existing land. Planting vegetation such as mangrove trees help trap sediment and curb erosion.

## TEACHER PREP NOTES

Each student group needs each of the materials listed, so quantity of materials is dependent upon number of groups. Students will sketch and write their individual observations and reflections so it is recommended they use the provided Sea Level Rise Worksheet or have designated pages in a science journal. The science journal can be a binder with loose leaf paper for each lesson so students can create their own graphs, sketches and reflection answers.

## BACKGROUND

The ocean is one large water system connected through surface and deep-water currents. There is a global conveyor belt of currents, connecting polar regions in the north and south to those tropical regions at the equator.

Due to the effects of climate change, the polar regions have seen an increased ice melt in both land-based ice and sea ice, including the polar ice in Greenland and Antarctica. The increased melting of these large quantities of ice can cause a rise in sea level along coastlines throughout the globe. This activity will explore how melting ice impacts sea level and show how the melting of land-based ice, which flows into the ocean, can raise sea level, while the melting of floating ice (such as icebergs) will not impact sea level due to displacement.

An object will float if it is less dense (less mass per unit volume) than the liquid it is placed in. Ice (frozen water) is less dense than liquid water so ice will float based on water's unique chemical bonding. The water that floating ice displaces is equal to the volume the ice would take up if it melted and became water again. This is why a glass of water doesn't overflow once the ice cubes melt. Since the ocean has already displaced water space to accommodate the floating iceberg, we don't see an increase in sea level once the iceberg melts. A rise in sea level is seen when land-based ice, such as glaciers and ice caps, melts into the ocean.

## ACTIVITY

Ask students where the predominant ice features in the world exist. Is the ice located on land or on water? Does it make a difference whether the ice is on land or water? Will land ice, sea ice or both cause the sea level to rise

## MATERIALS

- Two identical food storage containers (approximately 6 inches square)
- 8 sticks of classroom modeling clay (use Sculpey brand or something similar to that product. Model Magic disintegrates in water)
- 1 ruler
- 1 tray of ice cubes (may need to start storing ice cubes ahead of time)
- 1 liter of water
- Sea Level Rise Worksheets (page 10) (1 per student) or student's science journal

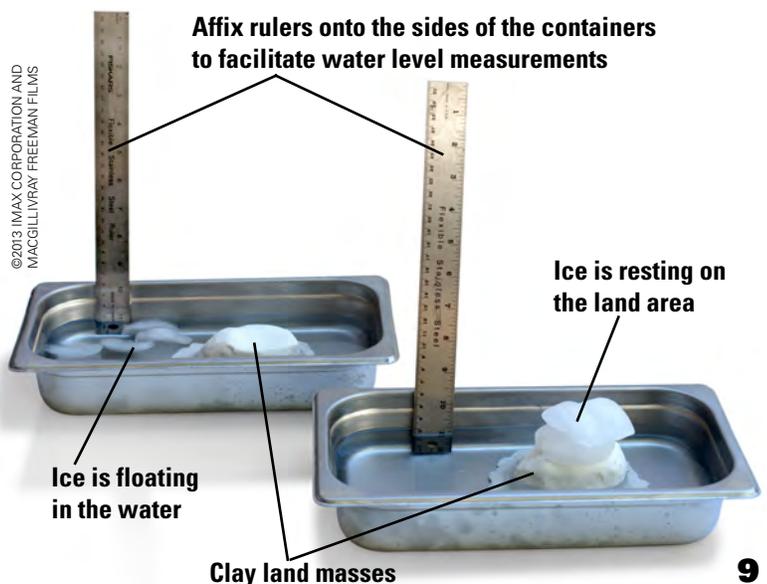
when they melt? Ask students to describe what could lead to the increased melting of ice in the polar regions?

- 1** Place half of the clay into one side of each container. Form the clay to represent land rising out of the ocean. In one container, form a level place at the highest part. It will act as a shelf for you to place ice cubes on later. Make rivers on the land if you like.
- 2** Place as many ice cubes as possible on the level place formed with the clay in the first container.
- 3** Place the same number of ice cubes next to the clay in the second container, so that they are resting on the bottom of the container. (Control the volume of ice so that both containers have equal amounts of ice.)
- 4** (Optional) Use clay to create a low-lying island so that it will be covered by the added water volume due to ice melt in the container with the ice on land, but not in the container with the ice in the water.
- 5** Pour water into the container where the ice is resting on the bottom until the ice floats. Be sure the ice is floating, not resting on the bottom. If this occurs, add more water.
- 6** Pour water into the second container with the ice resting on the clay (be careful not to disturb the ice cubes) until the water levels in the two containers are approximately equal.
- 7** On their Sea Level Rise Worksheets, have students record initial measurements of water height (in mm) using a ruler. For a visual impression you may wish to draw a line in the clay (with a pencil or toothpick) where the water height begins for each container.
- 8** Leave the setup. If possible, have students take measurements every hour and record the results on their worksheets. You can also leave the setup for several hours or overnight and just record the final measurement and any observations after the ice has melted. It helps to affix the ruler to the side of the container.
- 9** Have students include the answers to the following questions in their conclusions on the worksheet:
  - In which “situation” did the water level rise more?
  - How do the results compare with your predictions?
  - Why do you think this happened?

**10** Have classroom discussion.

- How does ice melt at the Poles impact the tropical zones along the equator? (There is one world ocean, and all ocean basins are connected through a system of global currents. Land ice melt at polar regions is one factor that contributes to the increase in global sea level.)
- Why might we be concerned about sea level rise? (Coastal areas will be flooded. People will lose their homes. Some fresh water resources will become too salty to use. Habitat loss will occur.)
- If an increase in certain greenhouse gases such as CO<sub>2</sub> can impact the rate of climate change, and since humans help contribute large amounts of CO<sub>2</sub> due to their activities, is there anything we can do to decrease CO<sub>2</sub> and thus its impact? (Take public transit instead of driving, eat local foods to reduce transportation impact, turn off lights and electrical equipment when not in use, plant a tree, reduce, reuse and recycle.)
- The film features people who live primarily on the coast of small islands, where there are no high elevation areas to migrate to in the event of a rising sea. What are their options if sea level rise impacts their island? If they leave their island home for another, what impact might that have on their cultural traditions? How might they acclimate to this new culture and maintain their own native island homeland culture? Have the students find examples of where this has already happened (Kiribati and the Maldives).

*This activity is modified from Global Climate Change and Sea Level Rise by California Academy of Sciences.*



# SEA LEVEL RISE WORKSHEET

---

Name: \_\_\_\_\_ Date: \_\_\_\_\_

1. Question:

2. Prediction:

3. Methods:

4. Measurements (results):

Comments or notes:

5. Conclusions and discussion:

Time (hours)	Water Height (mm)	
	Floating ice	Landlocked ice
0		
1		
2		
3		

---

# SEA LEVEL RISE WORKSHEET

---

Name: \_\_\_\_\_ Date: \_\_\_\_\_

1. Question:

2. Prediction:

3. Methods:

4. Measurements (results):

Comments or notes:

5. Conclusions and discussion:

Time (hours)	Water Height (mm)	
	Floating ice	Landlocked ice
0		
1		
2		
3		

# CORAL'S NIGHTTIME ROMANCE

## OBJECTIVE

Students will build a coral reef “globe” to illustrate the unique night behavior of coral polyps.

## IN THE FILM

In *Journey to the South Pacific*, we learn that the tides are strongest when the moon is full. The moon’s gravitational pull not only impacts tidal flow and currents around islands, but it is the full moon phase of the lunar cycle that acts as a major cue for the spawning of coral polyps.

## BACKGROUND

The following excerpt from the Flower Garden Banks National Marine Sanctuary gives a detailed explanation of broadcast spawning and the factors that lead to successful coral reef growth: “During spawning...corals release their sperm and egg packets into the water en masse. Only one species will spawn on any given night. This prevents fertilization between species (which would result in sterile offspring). The egg packets and sperm float to the surface, where the egg packets burst open, releasing millions of eggs to be fertilized. As the planulae (baby coral) develop over the next few weeks, they gradually become heavy enough to sink and settle on the bottom. Those that are fortunate enough to land in an area with the proper conditions will mature into coral polyps (individual animals) that will reproduce by splitting or ‘budding,’ thus forming a coral colony. Optimal growing conditions for reef-building stony corals include: a hard surface to anchor the polyp against currents and waves; warm water (68-85 degrees Fahrenheit); clear, sunlit water for the symbiotic zooxanthellae (algae) that lives in the coral’s tissue and produces the primary food source for the host coral; moving water, to provide a constant supply of microscopic plankton as a secondary food source.”

Indonesia’s Bird’s Head Seascape is known as the global epicenter of marine diversity in the world. This region has about ten times more species of coral than the Caribbean, and within a smaller area. There are more than 600 species of hard coral recorded in the Bird’s Head Seascape, which is 75% of all known coral species in the world. Roughly 75% of coral species reproduce through broadcast spawning ensuring they have a wide geographic distribution.

## MATERIALS

(Makes 20-24 globes)

- 20-24 glass jars (8-10 oz.) with screw-on lids—wide mouth works best
- Modeling clay—Sculpey brand works best
- Watercolor paint brushes with narrow handles (or other blunt-ended tools)
- 24 bump chenille stems (find at your local craft supply store; plain chenille stems or pipe cleaners will also work)
- Scissors or wire cutters
- Large mixing container (8 quart size or larger)
- 24 cups water
- Spoon
- Blue food coloring
- 8 tsp. (4 packets) Knox Original Gelatine (unflavored)
- Hot plate and container to boil water in
- 20-24 Tbsp. plastic stuffing pellets. (This can be found at craft stores. In order to be more conservation-minded and to avoid purchasing plastic, ask for alternatives at the craft store.)
- Teflon tape or other type of thread-sealing tape (used by plumbers to seal pipes by wrapping around the threads. Find it at your local home improvement or hardware store, or search the web for sources using terms such as ‘plumbers tape’ or ‘PTFE tape’ or ‘thread seal tape’.)

## KEY WORDS

**Tides**—The movement of water in relation to the gravitational forces of the Earth and Moon as well as the rotation of the Earth. High tides indicate water when it is covering land and low tide is when water is pulled away from land.

**Coral**—A sessile animal that relies on its relationship with plant-like algae to build the largest structure of biological origin on Earth.

**Coral Polyp**—A small animal that is round with a ring of tentacles surrounding a mouth. Usually found with symbiotic algae in their tissues, which act as a primary food source. Their secondary food source comes from capturing plankton with their tentacles. Corals use limestone in sea water to construct a hard skeleton around their soft tissue.

**Broadcast Spawning**—The release of gametes (sperm and eggs) into the water column resulting in an external fertilization process. The microscopic coral grows along the surface and eventually settles on the seafloor to grow.

**Budding**—A process where a mature coral polyp reproduces by dividing and creating a smaller genetic “clone.”

**Sessile**—Permanently attached or fixed, not free-moving.

**Planula**—Baby coral or the free-swimming or crawling larval phase of coral growth which is egg-shaped and has numerous tiny hair-like projections or cilia.

**Symbiosis**—The close relationship between two species that is mutually advantageous.

**Zooxanthellae**—Photosynthetic algae living in coral tissue that produce oxygen, help the coral remove waste, and provide 90% of organic products which drive the growth of coral reefs. The coral provides the algae with a protected environment for their photosynthetic work.

**Photosynthesis**—The process of converting light energy to chemical energy, used to produce organic compounds.



PHOTO: MICHELE HALL  
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*A healthy coral reef located in Raja Ampat at the center of the Bird's Head Seascape. More than 600 species of hard corals are found in this unique ocean area.*

### TEACHER PREP NOTES

In order to avoid taking up a large amount of classroom time, you should do much of the prep ahead of time. Each student will be taking home a globe so you can ask the students to help collect needed items from around their home to cut down on the shopping list. Also, familiarize yourself with the basics of coral anatomy and reproduction by visiting the NOAA website: [coralreef.noaa.gov/aboutcorals/coral101/](http://coralreef.noaa.gov/aboutcorals/coral101/)

### ACTIVITY

- 1 Show students pictures of a coral reef (picture hand-outs, projection on the board or at their individual computer or internet-connected mobile device). Include a diversity of coral-building species and other coral inhabitants such as Christmas tree worms and fish.
- 2 Ask students a variety of questions such as: are corals plants or animals? How do they eat? Do corals move around? How do they reproduce? Brainstorm ideas and write them on the board.

- 4 Ask students to explain how a jellyfish gathers food. (Jellyfish have tentacles covered in nematocysts to “sting” prey and oral arms to carry prey to their mouths).
- 5 Explain that corals and jellyfish are in the same phylum called Cnidarians (having cells that specialize in “stinging”). Explain how coral polyps feed and discuss their anatomy.
- 6 Ask students if they think corals “move around” and if so, how? Since corals are sessile, how would coral reefs reproduce and grow? Brainstorm ideas and write them on the board.
- 7 Explain to students the two most common reproduction strategies for coral: broadcast spawning and budding (out of the four possible reproduction strategies. Learn more at NOAA website link above under Teacher Prep).
- 8 Explain a symbiotic relationship and relate it to the role of zooxanthellae.

- 12**
  - 3 Sketch the general outline of a polyp and a jellyfish.

## Create the Coral Spawning Globe:

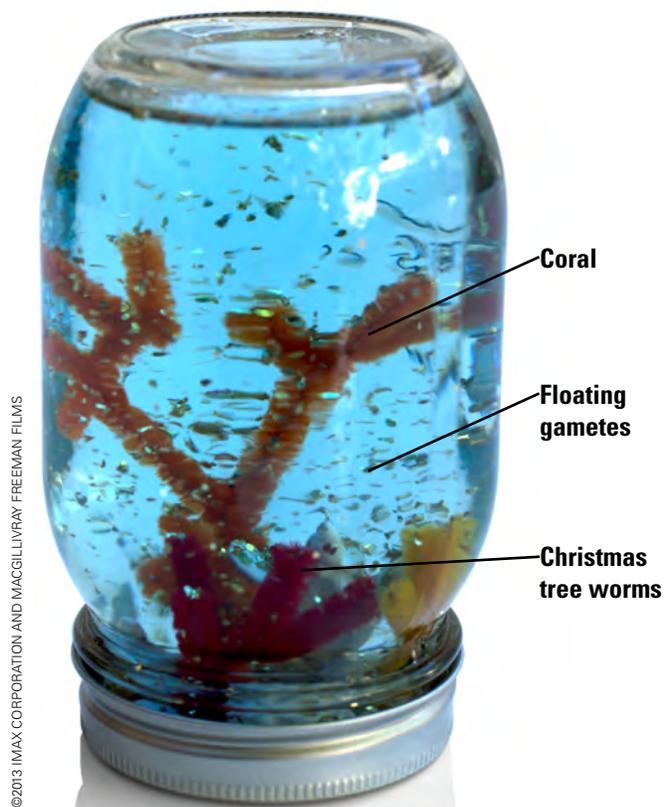
- 9 Use various colors of modeling clay to create a small reef of boulder corals and sponges that will fit inside each jar lid.
- 10 Place a reef on the inside of each jar lid, pressing firmly around the outer edges to make it adhere firmly to the lid.
- 11 Use the handle end of the paint brush to poke shallow holes into the “corals” to represent the individual coral cups that make up a whole coral colony.
- 12 Cut apart each pipe cleaner or chenille between each of the fluffy segments.
- 13 Fold each chenille segment in half and press the folded ends into the “reef” at various intervals to represent Christmas tree worms (about 3-4 per reef).
- 14 Sprinkle gelatine over 6 cups of cool water in a mixing container.
- 15 Bring remaining 18 cups of water to a boil, and then add it to the contents of the mixing bowl.
- 16 Stir mixture until gelatine is thoroughly dissolved, then allow it to cool completely.
- 17 Add a few drops of blue food coloring to the gelatine mixture and stir until color is uniform.
- 18 Fill individual jars with blue mixture leaving room for displacement by coral colony.
- 19 Add 1 Tbsp. of plastic pellets to each jar. These represent the egg packets released by corals during sexual reproduction.
- 20 Screw the lid (with the reef attached) onto each jar. The reef will now be hanging upside down.
- 21 Check the liquid level in each jar. Remove or add liquid as necessary to make sure each jar is full.
- 22 Place a triple layer of Teflon tape around the top edge of the jar, covering the screw threads to prevent leakage, before screwing the lid onto the jar for the final time.
- 23 Shake up the jars and turn them upside down so that the lids are resting on the table. The plastic pellets should rise from the “reef” to what is now the top of the jar, resembling a mass spawning event on a coral reef.

## TAKING IT FURTHER

Have students do web research on the variety of species found on coral reefs in order to:

- Sketch a sample of a coral reef food chain
- Take a closer look at plankton, the coral polyp’s secondary food source
- Explain the value of coral reefs and the threats they are under

*This activity is modified from Coral Spawning Globe by Flower Garden Banks National Marine Sanctuary.*



# GETTING SCHOOLED BY SHARKS

## OBJECTIVE

Students will research sharks and the conservation issues surrounding them. Student work will be reflected through outreach materials such as classroom posters that will illustrate the biodiversity of sharks, misconceptions surrounding sharks, and the threats facing various species.

## IN THE FILM

In *Journey to the South Pacific*, Jawi nervously awaits his first interaction with a gigantic whale shark. Once in the water, he delights in swimming with these gentle plankton-feeders. The commercial fishermen in Cenderawasih Bay,

West Papua, consider the presence of whale sharks a good luck omen. To encourage their presence, they often feed them by dropping small fish in the water. The whale sharks siphon small fish and plankton into their large mouths, and their gills serve as sieves. Jawi's positive experience highlights that through personal observation and learning, we can change

our perspective and appreciation—even of a species often viewed as a “villain.”

## BACKGROUND

Across the globe people have different perceptions of sharks. To some, sharks evoke fear. For others, they are a source of food, and in some places, sharks are a source of recreation and tourism dollars through in-water experiences. Sharks are cartilaginous fish and demonstrate incredible diversity and adaptation as an animal species.

The whale shark is the world's largest fish and can measure over forty feet long, longer than the average school bus. Even though its size is striking, its food habits are that of a gentle feeder, using its three- to four-foot-wide mouth to collect plankton and small fish at the ocean's surface. The whale shark's distinctive markings—white or pale yellow spots and stripes—are unique to each individual, similar to fingerprints in humans. Capable of living 60 years or more, they are listed as a “vulnerable species” as human activities have put their population under stress.

They are hunted for their meat, fins, and fish oil, and are also victims of bycatch.

There are more than 400 species of sharks, and they are far more valuable alive in their ecosystem as apex predators at the top of the food chain than in a soup bowl or on a plate. Sharks keep other species in balance by preventing overpopulation by any one animal. The key in any ecosystem is balance—too few or too many of any one species is the sign of an unhealthy ecosystem. Without sharks, the fish they feed upon will have a boom in numbers. These fish will in turn increase their feeding on smaller fish, and on down the food chain. Sharks not only keep populations in check but they also hunt ill, weak, or injured individuals. Despite the important role sharks play as apex predators in the ocean, humans are the ultimate predator and kill millions of sharks every year for food, sport, “nutrition” supplements, and as incidental bycatch. Shark populations have been depleted in regions around the globe but Raja Ampat has created a shark finning ban, the only region in Indonesia to do so. Through this ban and the creation of “No-Take Zones,” an increase is starting to be seen in the formerly depleted shark populations throughout Raja Ampat.

## MATERIALS

- Computers or mobile devices with internet access
- Websites listed in the Teacher Prep Notes (optional)
- Large wall-size “Post-It” notes
- Colored pens and pencils
- Measuring tape to measure shark species lengths (optional)
- Sidewalk chalk for sketching shark lengths (optional)
- One World One Ocean Campaign's Whale Shark Infographic as an example of an outreach piece

## TEACHER PREP NOTES

Students will conduct internet research to create their posters or PowerPoint presentations and other outreach materials. Below is a list of websites to assist in developing a list of resources students can use:

[One World One Ocean Campaign](#) (key word: Sharks)

[Discovery Channel](#) (key word: Shark Week)

## KEY WORDS

**Shark finning**—The removal of a shark's fins while it is still alive. The fins are kept while the body of the shark is usually put back in the ocean (where the shark dies).

**Bycatch**—When one species is unintentionally caught while the fishery is targeting another species.

**Conservation**—The official care and protection of species and/or natural resources.

**National Geographic** (key word: Animals)

**Conservation International** (key word: Sharks)

**Florida Museum of Natural History**

(key word: Ichthyology)

**Shark Savers** (key word: Education)

**ProjectAWARE** (key word: Sharks)

**Wildaid** (key word: Sharks)

**Shark Stewards**

## ACTIVITY

Lead a student discussion with the following questions:

- What comes to mind when you hear the word “shark”? What is the average number of sharks killed each year by humans and what is the average number of shark incidents with humans?
  - What types of sharks have you heard about? Which are most endangered?
  - What do you want to know about sharks? What do people need to know about shark finning that would help them refuse to consume shark fin soup? (After the fin is cut off, the shark is left to swim in circles, slowly drowning.)
  - Are there any threats to sharks? If so, what? Who? Older students can take on the role of an environmental lawyer arguing for shark finning bans.
  - What is the value of sharks to their ecosystems? What does an “unhealthy ecosystem” look like?
  - For the younger students, have them take on the role of a shark. Describe what they eat, where they live, and their role in their ecosystem.
- 1** On the board or in a hand-out list the websites and key words found in the Teacher Prep Notes.
  - 2** Instruct students that they will be conducting internet research in a team of two.
  - 3** Divide the room into two groups. One group will research the diversity of species, behavior, and natural history information about sharks, and the other group will research the conservation issues surrounding sharks and the threats they face. Ask students to generate their own questions about what we still need to learn and research about sharks.
  - 4** Once students have some time to research the websites to decide on their species or issue, have them sign up on the board and list their chosen topic to prevent duplicate work.
  - 5** While all websites have facts and information, let students know that the following websites also have



*Three of the world's more than 400 species of sharks.*

samples of how to present information in an engaging way through infographics: One World One Ocean Campaign, Project AWARE, and WildAid.

- 6** Give students a class period to research their information online and a second class period to create their outreach poster or PowerPoint presentation.
- 7** Students will present their posters or PowerPoint presentations to classmates in an additional class period.

## TAKING IT FURTHER

Students can share what they learned and created by hanging materials around the classroom and holding a “Shark Open House” where they can discuss their work with fellow students. To “advertise” the event, ask students to create chalk drawings of sharks, shark length outlines, and shark facts around the school campus (always check with your school administration about using sidewalk chalk).

# SEA TURTLE SURVIVOR!

## OBJECTIVE

Students will simulate the lifecycle of a sea turtle and the threats it faces by navigating an obstacle course. The course will take participants through distinct turtle lifecycle zones: the beach nest where they hatch, their journey from nest to the ocean, their migratory life in the open ocean, and the female turtle's journey back to the same beach where she was born to lay her own clutch of eggs.

## IN THE FILM

*Journey to the South Pacific* shows a variety of sea turtle species and highlights two in particular: a hungry hawksbill dining on toxic sponges (which are harmless to sea turtles) and a western Pacific leatherback female after she has made

## KEY WORDS

**Marine Debris**—Any man-made object discarded, disposed of, or abandoned that enters the coastal or marine environment.

**Hatchling**—A baby sea turtle that has newly emerged from an egg.

her trans-Pacific journey of over 6,000 miles back from northern California (where she foraged on jellyfish) to north West Papua's sand beaches (where she builds her nest and lays her clutches of eggs). This is the same beach

where she was born years earlier. The *Kalabia* instructors show students how sea turtles lay their eggs in sand nests and explain the importance of protecting these nests to help increase turtle populations. A leatherback lays eggs in up to 10 nests each season, more than any other turtle species. The relocation of these nests to hatcheries helps optimize egg survival and hatchling production. The nesting region of West Papua is considered the "last stronghold of the Pacific leatherback turtle." Without further protection, scientists predict that this critically endangered species could face extinction in the next 20 years.

## LESSON BACKGROUND

There are seven species of sea turtles, all of which are classified as reptiles, and all are listed as endangered. Four of these species are found nesting in Raja Ampat. Different species feed on different food sources—the largest sea turtle, the leatherback, feeds on jellyfish (which can often look very similar to a floating plastic bag) while the green sea turtle prefers algae and sea grass. The Pacific leatherback turtle, with its more than 6,000 miles of trans-Pacific migration, has one of the longest migrations of any marine

animal. While they spend their lifetime at sea, females come ashore to lay their eggs, returning to the beach where they were born. This happens after they reach sexual maturity at anywhere from 15 to 30 years of age. As hatchlings they are able to imprint and retain their birth location in the 30 minutes it takes them to crawl from their nest to the sea and remember this information 15 to 30 years later. All sea turtles, and the Pacific leatherback in particular, face a variety of threats, from the moment they hatch and dig their way up from the nest to their crawl to the sea where they begin their lifelong seafaring. Scientists have estimated that only 1 in 1,000 Pacific leatherback hatchlings survives to adulthood due to four major threats: beach predators such as pigs and dogs who eat turtle eggs; rising sand temperatures that can kill the eggs or prevent the production of male hatchlings; fisheries that kill turtles as incidental bycatch during their migration; and people who harvest turtles and eggs for food.

Sometimes called "the ambassadors of the ocean" because they can travel through the territory of at least 20 countries, the charismatic leatherback can grow more than six feet long, weigh as much as 2,000 pounds, dive to depths of 4,000 feet while holding their breath for up to 85 minutes and, if lucky, live for 100 years. The most widely distributed marine reptile species in the world, these "ocean ambassadors" move regularly across the Pacific and other oceans.

## TEACHER PREP NOTES

- 1 Increase your knowledge of sea turtles by visiting the Sea Turtle Conservancy website [ConserveTurtles.org](http://ConserveTurtles.org), see "Sea Turtle Information"

## MATERIALS

- Large playing area inside or outside at least 50 feet x 100 feet (see illustration)
- Two long jump ropes and two short ones
- Existing painted lines, rope, traffic cones or other boundary markers
- Two cardboard boxes (to represent fishing ships and the potential for entanglement)
- 100 tokens (may be poker chips, index cards, or other token)
- Whistle (optional)

## SET UP COURSE

- 1 Set up the boundaries for the 4 zones (see illustration):
  - Zone 1: **The Nest**—This is the starting point.
  - Zone 2: **Hatchling Beach**—One-fourth of the total playing area will be designated for the hatchlings' journey from the nest to the ocean. It will feature beach threats including sea birds and land predators.
  - Zone 3: **The Open Ocean**—Half of the playing area will be designated as the open ocean. Here, two fishing boats (cardboard boxes) represent the fishing fleets that use nets that put sea turtles at risk of becoming bycatch. The open ocean will also have several "marine debris hazards" representing entanglement or ingestion of plastics.
  - Zone 4: **Return Beach**—The remaining one-fourth of the playing area will be for the female turtle's journey back to the beach where she was hatched. This area will have two challenges: the sea turtles must first crawl up a sandy beach (made up of crouching participants), then complete a broad jump (representing potential debris on the beach).
- 2 Place one long jump rope between the Nest and Hatchling Beach to establish the obstacle course's starting point.
- 3 Place the two cardboard boxes in the Open Ocean to represent the Fishing Boats.
- 4 Scatter the tokens on each side of the Open Ocean just outside the boundary.
- 5 Position the two short jump ropes at Return Beach to create the broad jump area. The space between the ropes should provide a challenging but realistic broad jump.

## ACTIVITY INSTRUCTIONS

- 1 Gather students in the Nest. Describe the obstacle course, zone rules and challenges participants will encounter. Assign roles to participants for the following zones:
  - Choose two participants to represent Bird Predators for Hatchling Beach.

Note: after all the sea turtles have gone through Hatchling Beach, the two Bird Predators will move to Return Beach to monitor the "marine debris" broad jump.
  - Choose two participants to represent Land Predators for Hatchling Beach. They patrol the area just beyond the Bird Predators (swinging jump rope) to catch sea turtles heading to the Open Ocean.

Land Predators must catch the sea turtles by tagging them with both hands. They are only allowed to stay in one place, not moving their feet at all. When they catch a sea turtle, they must escort the "dead" sea turtle to Return Beach (onto the "sandy beach" area) before they can return to catch more.

Note: When all the sea turtle hatchlings have made it through Hatchling Beach, the two Land Predators will move to the Open Ocean to represent Marine Debris. The Marine Debris in the Open Ocean must catch the sea turtles by touching them with both hands. Similar to the rules for Land Predators, Marine Debris are only allowed to stay in one place, not moving their feet at all. When they catch a sea turtle, they must escort the "dead" sea turtle to Return Beach (where they will become the "sandy beach" the female turtles must climb on their way to their nesting site) before they can return to the Open Ocean to catch more.

- Choose two participants to represent the Fishing Boats in the Open Ocean. The Fishing Boats must keep one foot in their boat (cardboard box) but are able to slowly move (walk) by dragging their feet and keeping one foot in the box at all times. When they catch a sea turtle, they must escort the "dead" sea turtle to Return Beach (to the "sandy beach" area).
- All other participants not designated for roles above, are sea turtles and start the game in the Nest.

## STARTING AND PLAYING THE GAME

All participants should be in their place. Most of the students will be sea turtles.

**Nest**—All the sea turtle hatchlings start in the Nest. When the leader blows a whistle (or provides some other signal), they start their journey to the sea.

**Hatchling Beach**—As the sea turtles begin to move through Hatchling Beach, they must navigate their first hazard: Bird Predators (two participants swinging a long jump rope back and forth, low to the ground). All hatchlings must jump over the low-swinging jump rope. If a sea turtle comes in contact with the swinging rope, it dies, and moves over to Return Beach (to the "sandy beach" area). Once they successfully pass through the swinging rope, the hatchlings must face two Land Predators (representing foxes, monitor lizards and dogs). The Land Predators must tag the hatchlings with both hands to catch them. Upon catching a sea turtle, the Land Predator must escort the "dead" sea turtle over to Return Beach (to the "sandy beach" area) before returning to catch more.

**Open Ocean**—Sea turtles that successfully navigated the predator area of Hatchling Beach advance to the Open Ocean. (The Bird and Land Predators move to their next assigned zone positions: Bird Predators move to Return Beach to become marine debris monitors, Land Predators move to the Open Ocean to become Marine Debris. Caught turtles remain at Return Beach where they will become the “sandy beach” the turtles must climb later in the game.) In the Open Ocean, sea turtles must avoid the Fishing Boats (in boxes) and Marine Debris. The Fishing Boats must keep one foot in their box, but can slide the box around. To catch the sea turtles, Fishing Boats and Hazards must tag them with both hands. Caught sea turtles are escorted by the Fishing Boats or Marine Debris to Return Beach (to the “sandy beach” area), then the Fishing Boats and Marine Debris return to the Open Ocean to catch more.

Sea turtles must swim back and forth across the Open Ocean a total of 4 times, collecting one token per crossing while avoiding Fishing Boats and Marine Debris. The tokens represent the turtle’s time feeding at sea while maturing into adulthood, which could take 9 to 30 years, depending on the species. Once a turtle reaches sexual maturity, it breeds, and if female, it will begin the long journey back to the Coral Triangle to lay its eggs on the same sandy beach where it was hatched. After safely crossing the Open Ocean and collecting a total of four tokens, the sea turtles advance to Return Beach.

**Return Beach**—The remaining sea turtles that have successfully navigated both Hatchling Beach and Open Ocean will now make their way to Return Beach where they must crawl up a sandy beach to get to their nesting dig site while avoiding potential marine debris. The sandy beach area is made up of all the sea turtles who were caught by Bird and Land Predators, Fishing Boats or Marine Debris. To make the sandy beach area, participants crouch down on all fours in a row, with a 3-foot-wide space between them. The sea turtles heading up the beach must carefully step over each person. The crouching sandy beach participants must remain immobile and may not touch the sea turtles as they step over them.

After climbing up the sandy beach, the sea turtles must now navigate marine debris as represented by the broad jump challenge. A sea turtle must successfully broad jump the entire width of the marine debris to continue. If a sea turtle fails (hits the rope or falls short of clearing it), it must return to the bottom of the sandy beach to try again. A sea turtle that survives the entire course reaches the final nesting dig site (the finish line) to lay her clutch of eggs.

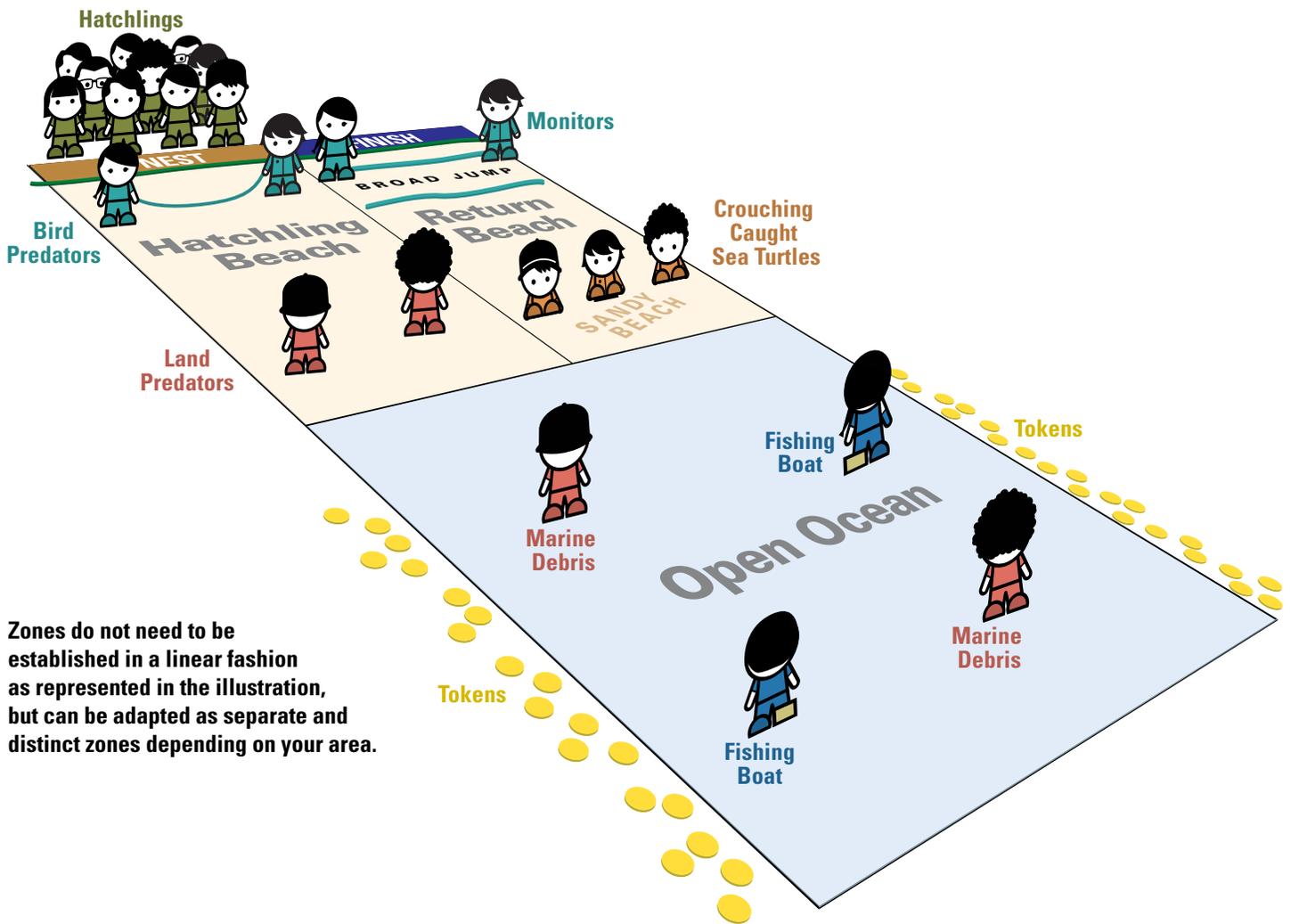
## POST ACTIVITY DISCUSSION

Have a wrap-up discussion by asking students how many sea turtles started the course. How many survived? It is estimated that only 1 in 100 hatchlings survives to adulthood. Given that turtle eggs are especially vulnerable to predators, many sea turtles perish before even hatching. Try the game again by running the obstacle course with only half the number of sea turtle hatchlings. What would be the final outcome? What if only 25% hatched and started their journey? What if only 10%?

## TAKING IT FURTHER

The film features the island communities of Raja Ampat. Learn more about community members’ active role in conserving and protecting sea turtles from this One World One Ocean Campaign blog post: [www.oneworldocean.com/blog/entry/from\\_turtle\\_harvest\\_to\\_turtle\\_hom](http://www.oneworldocean.com/blog/entry/from_turtle_harvest_to_turtle_hom)

*This activity is adapted from Hooks and Ladders by Project Aquatic WILD.*



Zones do not need to be established in a linear fashion as represented in the illustration, but can be adapted as separate and distinct zones depending on your area.

Zone 1	Zone 2		Zone 2		Zone 3		Finish
Nest	Hatchling Beach		Open Ocean		Return Beach		Finish
	Bird & Land Predators		Fishing Boats & Marine Debris		Sandy Beach & Broad Jump		
Hatchlings start here	2 Bird Predators with low swinging jump rope	2 Land Predators	2 Fishing Boats with boxes Sea Turtles travel back and forth collecting a total of 4 tokens	2 Marine Debris Sea Turtles travel back and forth collecting a total of 4 tokens	Sandy beach comprised of crouching caught sea turtles	Broad jump (representing marine debris)	Successful return to their nesting beach
	Caught sea turtles go to sandy beach	Caught sea turtles are escorted by predator to sandy beach	Caught sea turtles are escorted by predator to sandy beach	Caught sea turtles are escorted by predator to sandy beach			
	Bird Predators go to monitor marine debris challenge at Return Beach	Land Predators become Marine Debris in Open Ocean					

# UNDERWATER PARKS

## OBJECTIVE

Students will learn about Marine Protected Areas (MPAs), which are similar in concept to a national park. To increase their sense of environmental stewardship, students will create their own “special place” at school and/or in the community to protect, nurture and enjoy.

## IN THE FILM

We learn about the success of an MPA off the island of Misool. This ocean oasis was once heavily overfished and

damaged by the use of destructive fishing practices such as dynamite fishing.

A husband and wife team, the Miners, partnered with the locals to develop an eco-resort with a surrounding MPA that together brought financial viability to the area. Within a few years, the reefs, fish and shark populations dramatically increased in this protected marine reserve which includes significant No-Take Zones

(NTZs) (areas where no fishing of any kind is allowed).

## KEY WORDS

### Marine Protected Area (MPA)—

Similar to national parks, Marine Protected Areas are special places set aside to protect and manage wildlife and ocean ecosystems.

**No-Take Zone (NTZ)**—Also called Marine Reserves, NTZs are defined as ocean areas that are fully protected from activities that remove animals and plants or alter habitats.

**Stewardship**—The careful and responsible management of something entrusted to one’s care.

## BACKGROUND

Bird’s Head Seascape, with Raja Ampat at its center, is regarded by many as the ultimate hope spot for ocean conservation and is home to the largest marine national park (Cenderawasih Bay) in Indonesia. Raja Ampat means “Four Kings,” a reference to its four main islands: Batanta, Misool, Salawati and Waigeo. Many additional small islands host some of the most incredible underwater biodiversity in the world, including the planet’s richest coral reef ecosystems. Its majestic reefs are unlike any other, featuring nearly 600 species of hard coral characterized by their unique resilience to temperature changes. Powerful currents between the Indian and Pacific Oceans act as seed carriers—carrying coral species to other reefs in the surrounding area, thus supporting greater biodiversity.

Raja Ampat is home to a growing number of MPAs, and in places like the Southeast Misool MPA, locals are actively engaged in enforcement and community outreach programs. Here, local villagers patrol two highly successful

No-Take Zones. These NTZs comprise approximately 22% of the SE Misool MPA, and sea life is flourishing as a result of the special protection within these zones.

A team of local villagers employed as rangers patrol the waters for illegal fishing activities. These rangers work directly with local law enforcement officials to facilitate arrests when necessary. This program embraces culturally rooted conservation practices (such as *sasi*, a belief in the long-term environmental and economic benefits of restricted access and limited harvest periods) and traditional Papuan village law (*adat*) to engage local islanders in meaningful conservation efforts.

A recent report on the status of Raja Ampat’s biological diversity notes that over a 3- to 5-year period researchers made the following observations:

- In unprotected areas (not designated as MPAs), there was a significant decrease in sea life.
- Notably, even established MPAs experienced a decrease in sea life. Sadly, illegal fishing—especially by vessels registered in other countries—persists in many MPAs due to the lack of funding for effective law enforcement.
- However, in ranger-patrolled NTZs, there was a marked increase in sea life—fish, shark, and coral populations are rebounding and thriving.

## MATERIALS

- Computers or mobile devices with internet access
- Websites listed in Teacher Prep Notes (optional)
- Large wall-size “Post-It” notes
- Colored pens and pencils
- Map of school for brainstorming “special place”

## TEACHER PREP NOTES

In order to prepare students for creating an action campaign and presenting information, you might want to consider first doing Lesson 4 on sharks. Students will be doing internet research to create posters and other outreach materials. Since the students will be searching for a place on campus or in the community to clean up, restore, or plant, you will want to come up with a short list of potential locations.

Listed below is a selection of websites students can use in their internet research on Marine Protected Areas:

- [National Marine Protected Areas Center](#)
- [NOAA National Marine Sanctuaries](#)
- [Thank You Ocean Campaign](#)  
(keyword: Marine Protected Area)
- [Ocean Health Index](#) (keyword: Marine Protected Area)
- [Conservation International](#)
- [Ocean Conservancy](#) (keyword: Marine Protected Area)
- [AAAS Science NetLinks](#) (keyword: Marine Reserves)

## ACTIVITY OVERVIEW

- 1** Students will work in pairs to research MPAs.
- 2** Students will create a series of posters on the role the ocean plays in their daily lives and the facts and benefits of MPAs.
- 3** Provide students with one to two class periods to research MPA facts.
- 4** Ask students to generate their own questions about what needs further research: the ecological and economic benefits of MPAs, the different level of protections and what impact they have on marine life. Include information on non-protected areas to compare. Include facts about the role the ocean plays in their everyday lives.
- 5** Search for sample poster styles and sample public campaigns (see outreach style examples in Lesson 4) to help in their design and development of effective outreach communication.
- 6** Allow a class period to create the posters.
- 7** Students will share their posters in class and then hang them around the school campus.
- 8** Now that students have an understanding about their connection to the environment, particularly the ocean, enlist them as campus ocean ambassadors to encourage fellow students and clubs to support ocean organizations like One World One Ocean

Foundation that work to create and support MPAs around the globe.

- 9** Students will now have a deeper understanding of the importance of designating and protecting areas in nature and should be encouraged to locate a place they want to protect.
- 10** Help students find a special place on your school grounds and consider ways to establish a natural, thriving environment. Is it a space where you can create a native plant garden? Vegetable garden? Restore an area to its natural state or create a new place for recreation?
- 11** Work with students to develop a plan to keep their designated place clean and maintained for years to come.

## TAKING IT FURTHER

Find a place in your community that your school can adopt. Is it a watershed area? A local beach? A patch of native plants to tend to? A field that can be planted into a vegetable garden or native plant garden? Or a new recreation space? Take the steps you learned and practiced at school and implement them in your hometown. Create your own special protected place in nature for your entire community.



## RESOURCES

### **Coral Reef Adventure Educator Guide**

The educator guide for MacGillivray Freeman's giantscreen film *Coral Reef Adventure* is filled with additional information and hands-on lessons about coral reefs, coral reef inhabitants, and ocean science. Concepts include biodiversity, symbiosis, conservation, physics, and research methods. Visit [www.coralfilm.com/LearningAboutReefs/EducationalActivitiesandResources](http://www.coralfilm.com/LearningAboutReefs/EducationalActivitiesandResources) to download a copy of the guide.

### **One World One Ocean Campaign**

MacGillivray Freeman's One World One Ocean Campaign produces multi-media programming designed to change how people see and value the ocean. The campaign's vast library of videos, infographics, blogs, photos and more are available free of charge to educators looking for resources to extend ocean education in the classroom.

[OneWorldOneOcean.com](http://OneWorldOneOcean.com)

### **Conservation International**

Conservation International (CI) works to ensure a healthy and productive planet for us all. CI has been a leading force in marine conservation in the Coral Triangle since 1987, and started the *Kalabia* marine conservation education program. Now run by an independent Indonesian foundation, Yayasan Kalabia Indonesia, the *Kalabia* program is an overwhelming success with villagers and the government of Raja Ampat. The educational team has now made 17 trips to different parts of Raja Ampat, educating more than 1,650 students.

[Conservation.org](http://Conservation.org) (key word: Kalabia)

### **Reef Resilience**

Reef Resilience provides information about building resilience into coral reef management strategies and resources on global coral reef ecosystems.

[ReefResilience.org](http://ReefResilience.org)

### **Coral Reef Conservation Program**

The National Oceanic and Atmospheric Administration's (NOAA) Coral Reef Conservation Program supports effective management and sound science to support coral reef conservation.

[CoralReef.noaa.gov](http://CoralReef.noaa.gov)

### **Sea Turtle Conservancy**

The mission of the Sea Turtle Conservancy is to ensure the survival of sea turtles within the Caribbean, Atlantic and Pacific through research, education, training, advocacy and protection of the natural habitats upon which they depend.

[ConserveTurtles.org](http://ConserveTurtles.org)

### **Moss Landing Marine Laboratories**

Moss Landing Marine Laboratories (MLML) has an international reputation for excellence in marine science research and education, and is the second oldest marine lab on Monterey Bay. MLML's Teaching Enhancement Program has designed a Pacific Leatherback Sea Turtle Activities packet for K-12 classrooms. The packet includes information about leatherbacks and fun activities that reinforce student learning.

[Teach.mlml.calstate.edu/turtle](http://Teach.mlml.calstate.edu/turtle)

### **Marine Protected Areas**

Marine protected areas are special places in our oceans. Whether they've been set aside to protect endangered species, sensitive habitats, or cultural heritage, MPAs work to protect vital ocean regions.

[MarineProtectedAreas.noaa.gov](http://MarineProtectedAreas.noaa.gov)

### **Ocean Health Index**

The Index is a comprehensive new measure that scores ocean health from 0-100. It defines a healthy ocean as one that sustainably delivers a range of benefits to people both now and in the future.

[OceanHealthIndex.org](http://OceanHealthIndex.org)

### **WildAid**

WildAid's mission is to end the illegal wildlife trade in our lifetime by reducing demand through public awareness campaigns and providing comprehensive marine protection.

[WildAid.org/sharks](http://WildAid.org/sharks)

### **SeaTurtle.org**

SeaTurtle.org supports research and conservation efforts in the sea turtle community. The website includes valuable background information on turtle conversation work and a definitive list of sea turtle resources on the Web.

[SeaTurtle.org](http://SeaTurtle.org)

### **World Wildlife Fund**

World Wildlife Fund (WWF) is the world's leading conservation organization, supported by close to 5 million members globally. WWF's work in the Coral Triangle includes a focus on protecting sea turtles with such projects as community patrolling of sea turtle nesting beaches, building hatcheries to protect sea turtle eggs and hatchlings, developing alternative sources of protein and income for local residents, and supporting sea turtle-based ecotourism.

[WorldWildlife.org/places/coral-triangle](http://WorldWildlife.org/places/coral-triangle)

## ACKNOWLEDGEMENTS

One World One Ocean Foundation, a registered 501(c)(3) public charity, provided funding for this educator guide. The Foundation uses the power of giant-screen films to educate the public—inspiring people to take action to protect the world’s ocean. By creating and participating in conservation efforts, educational media, and outreach programs, we motivate people to become ocean ambassadors and join us in caring for our fragile water planet.



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Learn more about the IMAX® film *Journey to the South Pacific* at [www.imax.com/journeytothesouthpacific](http://www.imax.com/journeytothesouthpacific).

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Narrated by Academy Award® winner Cate Blanchett, *Journey to the South Pacific* takes moviegoers on a breathtaking IMAX adventure to the lush tropical islands of remote West Papua, where life flourishes above and below the sea. Join Jawi, a young island boy, as he takes us on a journey of discovery to this magical place where we encounter whale sharks, sea turtles, manta rays, and other iconic creatures of the sea. Home to more than 2,000 species of sea life, this exotic locale features the most diverse marine ecosystem on earth. An uplifting story of hope and celebration, *Journey to the South Pacific* highlights the importance of living in balance with the ocean planet we all call home.

An IMAX Entertainment and MacGillivray Freeman Films presentation, *Journey to the South Pacific* is directed by two-time Academy Award®-nominated filmmaker Greg MacGillivray and Steven Judson and produced by Shaun MacGillivray and Mark Krenzien. Run time: 40 minutes.

IMAX ENTERTAINMENT PRESENTS A MACGILLIVRAY FREEMAN FILM "JOURNEY TO THE SOUTH PACIFIC" A ONE WORLD ONE OCEAN PRESENTATION  
NARRATED BY CATE BLANCHETT MUSICAL SCORE BY STEVE WOOD WRITTEN BY STEPHEN JUDSON PRODUCED BY SHAUN MACGILLIVRAY AND MARK KRENZIEN DIRECTED BY GREG MACGILLIVRAY AND STEPHEN JUDSON

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