

OCEANS



Background Information

Earth is the only planet in the solar system that has liquid oceans, large bodies of salt water. Earth has five oceans: Pacific, Atlantic, Indian, Arctic, and Southern (formerly called the Antarctic Ocean). The Pacific Ocean is the largest and deepest ocean. It is larger than all of the continents put together.

All of the earth's oceans are connected. In fact, there is just one big world ocean broken up by the continents into what look like five smaller, separate oceans. This world ocean covers just over two-thirds of the earth's surface, or about 140 million sq mi (360 million sq km). Its average depth is 16,000 ft (5,000 m), and its total volume is about 322,300,000 cu mi (1,347,000,000 cu km).

Most of the salt in ocean water comes from dissolved mineral salts in the earth's rocks. Rain falling on the earth is slightly acidic, which slowly erodes and dissolves rock. The dissolved salts flow into rivers, and the rivers carry these salts to the oceans. Some salt comes from volcanic gases and hot fluids released from under the ocean floor. Salt does not evaporate out of water. For these reasons, earth's ocean water has stayed salty over millions of years even though fresh water has constantly moved into the ocean through precipitation.

Because water is essential for life, earth's inhabitants all depend on the ocean water. **Marine life** refers to the huge variety of plants and animals that live in the ocean itself. Some marine plants and animals live along the oceans' shore, some in bays, and

others deep in the ocean. These plants and animals make up three large groups:

- **Benthos** refers to plants and animals that live on or near the ocean floor. Examples: kelp, brittle stars.
- **Nekton** refers to animals that swim wherever they want in the ocean, independently of its currents. Examples: fish, whales.
- **Plankton** refers to organisms so tiny that they are carried along by the currents. Most live on or near the surface of the water. Examples: algae, jellyfish.

Humans also depend on the ocean. Historically humans have used the ocean for food and travel. In the modern world, people use the ocean for food, fishing, recreation, tourism, travel, shipping, and mining for oil and minerals. As cultural atlases show, many of the world's populations cluster along the ocean shoreline.

Unfortunately, as humans increase in number, they produce more waste, use more resources, and sometimes release poisons into the ocean, such as spilled oil from tankers or chemicals from a factory. As a result, many species of marine plants and animals have been injured or become **endangered**, their numbers so low that the species might cease to exist, or become **extinct**, where no living members of a species are left anywhere on earth. On a positive note, many people today are working to protect the ocean and reduce or stop the activities that harm marine and human life.

Did you know?

- Pounding ocean waves can erode an open coastline by a few feet (about a meter) per year.
- Hearing is the most important sense to many marine mammals. Whales and dolphins rely on clicks, whistles, or songs to communicate with each other.
- Some marine mammals can stay under water for almost 2 hours.
- US residents eat an average of 15 pounds (7 kg) of fish and shellfish every year.
- The human body is about two-thirds water, just like the earth.
- Two of the world's most endangered species of marine mammals live in US waters. Only about 300 northern right whales remain off the east coast, and only about 1,300 Hawaiian monk seals remain in the Hawaiian Islands.
- In 1994, the gray whale was taken off the endangered species list. It had come close to extinction because of commercial whaling in the 1800s.

Resources

Day, Trevor. *Ocean Datafiles (Popular Science)*. San Diego, CA: Silver Dolphin Books, 2000.

ACTIVITY 1

Studying Oceans as Part of the Water Cycle

Purpose

To learn what oceans are and how they are made.

Material

Globe.

Map of the world.

Geography Journals and pencils.

Presentation

- Most Montessori teachers present this concept in Year 1.
- Review the definition of ocean with the students.
- Ask the students to find the five oceans (Pacific, Atlantic, Indian, Arctic, and Southern) on the globe and on the map. Discuss how the five oceans are really one large ocean.
- Explain that most of the water in the oceans comes from the world's rivers. Using the globe, invite the students to find and follow the courses of major rivers flowing to the world's oceans.
- Using the map, invite the students to find and follow the courses of major rivers flowing to the world's oceans.



- Ask the students to use their journals to name the five oceans and to name one major river that flows into each.

Extensions

- Research the ocean floor: what it looks like and what species live on it.
- Use math skills to work out how long it would take to cross each of earth's five oceans by boat or by plane.
- Find pictures, stories, poems, and songs about oceans.
- Research how one of the five oceans was named.
- Search for stories and articles about the power of the ocean. One example is the **tsunami** that resulted from an earthquake off the coast of Indonesia in December 2004.

ACTIVITY 2

Studying Marine Life

Purpose

To learn about the plants and animals that live in the world's oceans.

Material

Books, pictures, stories, videotapes, and newspaper articles about marine plants and animals.

Geography Journals and pencils.

Presentation

- Most Montessori teachers introduce this concept in Year 1, and present it in more detail in Years 2 and 3.
- Define marine life and the three large groups of plants and animals that make up marine life (benthos, nekton, plankton).
- Ask what kinds of marine plants and animals the students have seen, read about, or heard about.
- View and discuss pictures of marine plants and animals.
- Ask the students to use their journals to write a short research report on an animal or plant found in one of the world's oceans. The students could consult print, web, and audio-video reference materials. Possible questions about a marine animal: In which ocean does it live, and in what part of the ocean? What does it look like (the student may attach a drawing or photograph)? What does it



eat? Who eats it? What part does it play in life in the ocean? Possible questions about a marine plant: In which ocean does it live, and in what part of the ocean? How does it receive nourishment? Who eats it? What does it look like (the student may attach a drawing or photograph)? What part does it play in life in the ocean?

Extensions

- Visit an aquarium to study marine animals and plants. Encourage the students to take notebooks and draw or write about the ocean plants and animals they see.
- If near an ocean, visit the shore and look for examples of marine plants and animals. Take notebooks, binoculars, and cameras. Encourage the students to photograph, draw, or write about the ocean plants and animals they find, and not move or disturb them.
- Make up a song and sing it, or create and perform a play about one or more examples of marine life. Students can work individually, in small groups, or as one team.

ACTIVITY 3

Appreciating Oceans' Importance to Life on Earth

Purpose

To understand how the world's oceans and humans and other living things depend on each other.

Material

Cultural atlas (showing human populations).

Chart showing endangered or extinct species of marine plants and animals.

Geography Journals and pencils.

Poster supplies (colored paper, markers, glue).

Presentation

- Most Montessori teachers present this concept in Years 2 and 3.
- With the students, list and describe the different ways that people all around the world depend on the ocean (fishing, recreation, tourism, travel, shipping, mining for oil and minerals).
- Refer to the atlas to show that many human populations are concentrated along the world's oceans.



- Refer to the chart to show endangered or extinct species of marine plants and animals. Discuss how species become endangered or extinct.
- To illustrate the ocean's vulnerability, talk about ways humans have affected oceans in a negative way. Examples: oil spills, sewage pollution, over-fishing.
- Discuss why it is important for humans to respect and protect oceans and the plant and animal life they contain.
- Ask the students to make a poster showing positive things people have done to protect marine life.

Extensions

- Introduce the name of someone who explored the ocean (e.g., Louise Arner Boyd, 1887–1972), or educated others about the ocean (e.g., Jacques Cousteau, 1910–1997). Ask each student to write a short biography of one of these people, including accomplishments and how the person contributed to other people's knowledge about the ocean.
- Watch a movie or documentary about humans working with whales or dolphins.
- Research and write about an endangered or extinct marine animal or plant.
- Collect two stories or newspaper articles about humans interacting with marine life in a positive way.

SEAS



Background Information

A sea is a body of salt water just like the ocean, but smaller. Many seas are connected to an ocean. For example, the Sea of Japan is connected to the Pacific Ocean, and the Caribbean Sea is connected to the Atlantic Ocean.

Seas can be **landlocked**, partially or completely surrounded by land. For example, the North Sea is partially surrounded by Europe, and the Caspian Sea is completely landlocked between Europe and Asia.

The earth's largest seas are the Arabian, South China, Caribbean, Mediterranean, and Bering. Some seas contain even smaller seas. For example, the Mediterranean Sea contains the Adriatic Sea and the Aegean Sea.

Did you know?

- Because seas and oceans are so similar, the word “sea” is often used interchangeably with the word “ocean.”
- Pirates, adventurers, and explorers who sailed the world's waters long ago used to refer to the oceans of the world as the Seven Seas. This term referred to the North Atlantic, South Atlantic, North Pacific, South Pacific, Indian, Arctic, and Southern oceans.