

Case Study: Galápagos Marine Reserve

Read the case study below. Underline any unfamiliar terms or facts you have questions about.

The Galápagos Marine Reserve is one of the largest and most biologically diverse Marine Protected Areas (MPAs) in the world. The MPA covers 133,000 square kilometers (51,352 square miles). It surrounds the Galápagos Islands in the eastern Pacific Ocean about 1,000 kilometers (600 miles) off Ecuador's coast.

The reserve is home to a wide range of species: whales, dolphins, albatrosses, sharks, sea lions, penguins, fur seals, rays, cormorants, marine iguanas, sea turtles, and tropical fishes. More than 2,900 marine species have been monitored, according to the Galápagos National Park Administration.

Several different habitats exist in the reserve. Underwater volcanoes or mountains, known as shallows, rise close to the water's surface and provide feeding grounds for tuna, sharks, birds, sea lions, and turtles. There are also reefs, underwater cliffs, wetlands, and lagoons.

The rich biodiversity is the result of the islands' location along the Equator. Warm and cold ocean currents mix with nutrient-rich cold water that rises from the ocean floor. Those nutrients create the food chain that sustains marine life, from tiny animals like the sea urchin to giant fish like the whale shark.

How the Galápagos became a Marine Reserve

The Galápagos Islands have been recognized as a unique ecosystem since Charles Darwin wrote about the islands in *The Voyage of the Beagle* and *On the Origin of Species*.

Darwin, a biologist studying fossils and animal species in South America in the mid-1800s, used the finches of the Galápagos to illustrate his theory of natural selection. He also wrote about the area's tortoises, fish, and marine mammals. Scientists have conducted extensive surveys of the archipelago for more than a century. In 1904, American scientists stayed in the Galápagos for an entire year, cataloging species, their behavior, and their habitat.

Galápagos in Danger

UNESCO placed the Galápagos Marine Reserve on its list of "World Heritage in Danger." These 34 World Heritage Sites are in danger of losing their unique characteristics. The Galápagos Islands are threatened by growing tourism, invasive species, illegal fishing, and undocumented immigration. The islands and marine area cannot support this growing human population.

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In 1959, the government of Ecuador created Galápagos National Park. In the 1970s, human activity such as agriculture and development was increasing on the islands. The surrounding waters began to suffer from pollution from agricultural runoff and urban waste. The Terrestrial Management Plan of the National Park, written in 1974, recommended protecting two nautical miles of sea around each of the area's 19 main islands.

Ecuador created the MPA in 1998. The reserve includes the area within 40 nautical miles from the islands' coasts, as well as the islands' inland waters, such as lagoons and streams.

Such a lengthy process to create a Marine Protected Area is not unusual. "Many take at least 10 years to get to designation status," says Caitlyn Toropova, the Marine Protected Areas coordination officer for the International Union for Conservation of Nature (IUCN).

The reserve is a UNESCO World Heritage Site, recognized for its value in conserving and maintaining unique species. It is managed by the Directorate of the Galápagos National Park.

The Goals of the Galápagos Marine Reserve

The MPA is designed to protect the biodiversity of the islands and the surrounding waters.

The park was also created to ensure the sustainable use of natural resources by local residents. Tens of thousands of people live on the Galápagos Islands, which include an Ecuadorian military base.

Some agriculture and fishing are allowed in the MPA, and tourism is the area's most important economic activity. More than 100,000 people visit the Galápagos Islands every year. The sustainable use practices of the MPA seek to balance the demands of the tourist industry and the pristine habitats tourists seek.

Environmental goals

Preserving native marine life is a key goal of the reserve. One of its most unique species is the marine iguana, the only aquatic lizard in the world. The iguanas are about 1-1.5 meters (3-5 feet) long and live along the shore of the islands. They also live among the lagoons and mangrove swamps.

Marine iguanas eat seaweed and other algae found clinging to underwater rocks and tree roots. The lizards dive up to nine meters (30 feet) to graze on algae.

Some amount of fishing is allowed, but the MPA maintains strict regulations. Poaching, or

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illegal fishing and hunting, is a threat to marine species in the MPA. Sometimes, poachers are fishermen who overfish, or harvest more than the MPA allows. Tuna and sharks are often overfished. Some of the most overfished animals are lobsters and sea cucumbers.

It is always illegal to hunt some animals in the Galápagos MPA. Sea turtles are illegally hunted for their meat. Sea lions are poached for their teeth and genitals, which are used in Asian medicines.

Non-native plants and animals also threaten the Galápagos marine ecosystem. Dogs and cats prey on tortoises, marine birds, and marine iguanas. Cockroaches feed on native insects, destroying an important part of the marine food web.

The Habitat of the Galápagos and the Uses of the Marine Reserve

In some places, the Galápagos Marine Reserve encourages tourism and recreational activities like scuba diving. It also allows people to harvest natural resources, such as fish. The reserve is host to scientific research and educational work.

Scientific Use

Applied research is one of the reserve's key missions. This research includes direct interaction with fish such as hammerhead sharks. Marine biologists also monitor the status of the reserve's sea cucumber and lobster populations. Scientists study the interaction between the marine and land ecosystems.

Some scientists work to support sustainable fisheries with fish aggregation devices (FADs). These tools, usually large buoys placed in the ocean, attract fish such as tuna. This makes the fish easier to find and catch.

The MPA focuses "on the development of various research projects to increase knowledge of marine ecosystems for the proper management and administration of resources," according to the Directorate of Galápagos National Park.

In some areas of the reserve, researchers study the impact of human activity on the marine ecosystem. They study fishing methods, agricultural practices, and pollution left by tour boats. Underwater and coastal cleanup may also be a part of a scientific expedition.

Commercial Use

Commercial fishing is allowed in some areas of the reserve. The lobster and sea cucumber fisheries are important sources of income to the local population, and fishermen from Ecuador regularly travel to the area in search of dorado, shark, and tuna.

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Scientists and fishermen regularly monitor the number and health of the fish and crustacean populations. The MPA trains locals in sustainable fishing practices.

Recreational Use

More than 100,000 people visit the Galápagos every year. Tourists are attracted to the clear water and the opportunity to interact with the archipelago's unique wildlife.

Some areas of the reserve allow sport fishing and other activities, such as snorkeling, scuba diving, boating, and whale watching. Divers are drawn by the large populations of rays, hammerhead sharks, and whale sharks.

In areas that allow recreational activities, removal of plants, animals, remains, or other natural objects is prohibited.

To ensure that tourists observe regulations, the reserve uses satellite-based geographic information system (GIS) technology to monitor activities in its waters.