

# Tides of time



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Costa Rica's Cocos Island, the focus of this installment of the 'Tides of Time' series, lies in the Panama basin of the eastern tropical Pacific along with three other World Heritage island sites: Ecuador's Galápagos, Panama's Coiba and Colombia's Malpelo

Hundreds of miles away from the Costa Rican coast, Cocos Island is relatively untouched. Its waters are favored by scuba divers, who come to observe the marine life, but also by legal and illegal fishermen, a threat that is a major challenge for the park rangers.

**COCOS ISLAND NATIONAL PARK** | Named as World Heritage in 1997

## Marine life abounds, from small coral-reef dwellers to large pelagic species

It's not hard to see how Cocos Island proved to be at least some of the inspiration for Michael Crichton's lost land in "Jurassic Park." If ever there was a place where dinosaurs might have survived, it's this super-secluded eastern Pacific landfall 550 kilometers, or 340 miles, from the Costa Rican coast.

Surrounded by deep ocean currents, smothered in jungle and rimmed by 600-foot (200-meter) cliffs, this volcanic island verily defines primeval. And there are huge creatures, some of them quite dangerous: blue whales and hammerheads, manta rays and whale sharks, immense sailfish and schools of yellow-fin tuna.

"For its size and isolation, Cocos Island is one of the natural sites less altered by man, with high endemism and high biodiversity," says Fernando Quirós Brenes, director of the Cocos Island Marine Conservation Area, which includes the terrestrial national park. "The island is designated as a natural laboratory for

research on the evolution of species and monitoring the long-term environment. The results of these could provide important insights into the dynamics of ecosystems and their relation to global changes in marine and terrestrial environments."

Located about halfway between Costa Rica and the Galápagos Islands, Cocos is unique in several ways. It's the only oceanic island in the eastern Pacific with a tropical rainforest, a lush covering of trees, shrubs and flowers nurtured by the volcanic soil and an average of 275 inches, or 700 centimeters, of rain a year. This makes Cocos one of the wettest places on earth. The heavy precipitation flows into numerous streams and small rivers, which tumble over the surrounding sea cliffs in more than 200 waterfalls.

Its position in the eastern Pacific makes it the first landfall for the North Equatorial

Countercurrent. As a result, the waters around Cocos teem with both tropical reef fish and large pelagic species like sharks, whales and rays.

"Around Cocos, the oceanographic conditions of high productivity favor the presence of abundant marine life," says Quirós. "It is common to see large feeding aggregations of pelagic species such as yellow-fin tuna, silky shark, black-tipped shark and Galápagos shark accompanied by bottlenose dolphins and hundreds of boobies."

Although the details of its discovery are disputed, Europeans first came across Cocos in the 16th century. Maritime explorers, whalers and pirates made landfall over the years, but the island was so remote it wasn't claimed by anyone until 1829, when Costa Rica took possession.

It became a national park in 1978 and

was declared a Unesco World Heritage Site in 1997.

Another unusual aspect of the island is an almost complete lack of an intertidal zone. Several bays support sandy beaches, but most of the shoreline is rocky with relatively short distances between the sea cliffs, the fringing reef and a steep drop-off into oceanic trenches. The World Heritage zone, expanded in 2002, extends up to 15 kilometers offshore to safeguard the integrity of these deeper areas.

More than 300 fish species have been spotted in the waters around Cocos, as well as numerous types of coral and crustaceans, and more than 600 species of marine mollusks. In addition to whales, marine mammals include the California sea lion and bottlenose dolphins. Three types of sea turtle also frequent the island.

Terrestrial Cocos supports three distinct types of vegetation: a coastal zone dominated by the coconut palms from which the

island derives its name; an inland rainforest with flora that ranges from delicate orchids and colorful bromeliads to large canopy trees; and a super-saturated cloud forest that rises to 2,079 feet on Mount Iglesias, the island's highest point.

As with so many secluded oceanic islands, endemism is common. More than 70 species of vascular plants are found only on Cocos. There are also three endemic bird species and two endemic reptiles (a gecko and anole lizard). The island and its offshore rocks host breeding colonies of a number of iconic migratory seabirds, including the frigate, noddy, booby and tern.

There are no endemic mammals. But over the years, visitors have introduced several exotic species that have since gone feral — cats, pigs and deer among them. These animals pose one of the biggest threats to the island's native flora and fauna, and efforts to eliminate them continue.

Another major threat is illegal fishing

inside the World Heritage zone and beyond. Yellow-fin tuna and sharks are the main targets, but other marine species are also impacted. Although Costa Rica has enacted laws to prevent the poaching, lack of funding, legal conundrums and the sheer logistics of patrolling an area so far from the mainland have prevented proper enforcement. "Due to uncontrolled fishing, the Costa Rican government has twice changed the park boundaries," says Quirós, "increasing the size at a distance of 12 nautical miles [about 20 kilometers] from the islets. Although restricting the situation for fishermen, this also makes the cost of management for the control and surveillance of fisheries greater."

About 3,000 people visit each year, most of them scuba divers intent on exploring the 20-plus dive sites. Visits are strictly controlled, and people are not allowed to stay overnight or remove anything (animal, mineral or vegetable) from the island and its surrounding waters.

J.R.Y.

**EASTERN TROPICAL PACIFIC MARINE CONSERVATION CORRIDOR** | Linking protected sites

## Conservation efforts go beyond national borders

Contradicting the typical image of the world's largest ocean, the eastern tropical Pacific is relatively staved of islands. One of the few exceptions is the Panama Basin, off the coasts of Central and South America. The basin is flanked by large underwater mountain ranges, which break the surface in four places — Costa Rica's Cocos Island, Colombia's Malpelo Island, Panama's Coiba Island and the Galápagos archipelago of Ecuador — each of them a protected area and Unesco World Heritage site.

Although widely dispersed across a vast expanse of open sea, the islands have much in common, part of a complex and interconnected biogeographic region with similar geologic, climatic, biologic and oceanographic dynamics. Fernando Quirós Brenes, director of the Cocos Island Marine Conservation Area, describes the region as offering "a trip back in time to observe how the oceans were before humanity exploded without measure."

All four landfalls boast volcanic origins, but the main geographical feature linking them together is the convergence of several major currents in the region. As a result, the waters around the islands are among the world's richest in terms of biodiversity and sheer numbers of a given species. The network of landfalls expedites the survival and transit of many different types of pelagic fish, marine mammals and migratory birds.

"Ecologically, this cluster of World Heritage marine sites is connected by a number

of species that move regularly between them," says Scott Henderson, regional director of marine conservation in the eastern tropical Pacific for Conservation International. "These movements have been confirmed through the use of satellite transmitting tags that track individuals' movements across the seascape. Oceanographically, the sites are connected by oceanic currents that move from north to south along the Central American coast and then veer to the west over the Galápagos."

Among the creatures that frequent these waters are humpback and blue whales, half a dozen shark species (including whale sharks and hammerheads), manta rays, sea turtles and schools of tuna, as well as marlin, swordfish and sailfish.

This incredible concentration of iconic species makes all of the islands prime locations for scuba diving, snorkeling and related tourism activities. At present, the Galápagos is the only one with a diverse and sophisticated tourism infrastructure. Around 170,000 tourists visit the Ecuadorian archipelago each year — a tenfold increase since 1985. Although smaller and in some cases more isolated than the Galápagos, the other three islands have the potential for similar visitor growth.

In addition to escalating tourism, the islands share other eminent threats like overfishing (both legal and illegal), growing ship traffic to and from the Panama Canal, and climate change. Among other concerns,

says Henderson, are unsustainable coastal development and a lack of national marine spatial and management plans to regulate activities in a sustainable manner.

"Our increasing understanding of marine ecosystems demands for more innovative and complex strategies to be implemented to achieve effective sustainable management of these areas," says Marco A. Quesada Alpízar, senior manager of the Costa Rica program for Conservation International.

### International cooperation

Slowly but surely that framework is taking shape. With a goal of protecting these islands and the open ocean between them, environmental agencies in all four nations banded together with international bodies including Unesco, Conservation International, the Charles Darwin Foundation, and the International Union for Conservation of Nature to form the Eastern Tropical Pacific Marine Conservation Corridor initiative in 2004.

The initiative seeks to lay the foundation for sustainable management of both ocean and island habitats through a series of activities to promote and strengthen regional and international cooperation. This holistic approach also includes the management of commercial fishing, transportation and tourism in the corridor.

One of the strongest supporters of the marine conservation corridor is the Friends of Cocos Island Foundation. "Marine species do not recognize political boundaries," the foundation declares on its Web site. "So it is imperative to have an integrated picture of their movements, migrations, population biology, conservation status, critical habitat and an understanding of how environmental conditions influence distribution."

"Protecting these islands as a conservation corridor rather than individual parks makes sense because these sites are connected biologically and socioeconomically," says Quesada. "In addition to their biological diversity, all the sites have great value to human societies that use, directly and indirectly, the marine space and resources that exist in each area. Not only several resources such as sharks, turtles and tuna are transboundary, but many other species of economic value exist in the region. The four marine protected areas are also major drivers of tourism in each of the countries."

He adds that, "today, more than ever," countries have a "common interest" to develop a regional strategy to reinforce the security of these environments.

J.R.Y.

### 180 skills and crafts come together in one 'ecosystem'

Time doesn't stand still. Neither does nature. World Heritage sites are constantly changing and evolving in response to the natural forces of wind, ocean and climate, as well as manmade forces that affect marine and terrestrial environments.

For example, Cocos Island, off the coast of Costa Rica, first emerged from the ocean as a result of tectonic and volcanic forces more than two million years ago. Today, it harbors 235 plant species and its surrounding waters play host to 32 coral species and 300 species of fish. From a relatively simple set of movements beneath the sea, Cocos Island has become a complex ecosystem that has an impact on — and is affected by — its surrounding environment.

Jaeger-LeCoultre, maker of fine timepieces, also does not stand still. Its origins can be traced to the tectonic force of one man, Antoine LeCoultre, who started the company 180 years ago in the Vallée de Joux of western Switzerland. Its early growth was due to the engineering skills and foresightful creativity of its founder, working with a handful

of artisans. The manufacture's reputation endures because of the ongoing inventiveness of its craftsmen and their ability to incorporate technological advances and new techniques into the watchmaking process. Today no fewer than 180 skills are required to develop and produce Jaeger-LeCoultre watches, and more than 1,200 employees work at the company headquarters in Le Sentier, a village in the Vallée de Joux.

The Duomètre Sphérotourbillon serves to illustrate this level of complexity and sophistication. It is a high-complication wristwatch with a multi-axis tourbillon that compensates for the pull of gravity in any position. Not only 180 skills and 180 years of experience but also the intervention of 40 professions are brought to bear on its creation. In the course of production, each component benefits from the entire range of skills cultivated within the manufacture, and a total of 3,331 operations are required to create a single Duomètre Sphérotourbillon. C.F.

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