

# The Top Ten Coral Reef Hotspots

Biodiversity is rapidly "bleeding away" in the coral reef hotspots, 10 regions exceptionally rich in marine species found nowhere else and also facing extreme threat. The coral reef hotspots are identified for the first time in a study conducted by the Center for Applied Biodiversity Science at Conservation International and published in *Science* magazine.

## WHAT IS A CORAL REEF?

Coral reefs are constructed by living plants and animals, primarily corals that surround their small anemone-like tentacles in a hard skeleton that forms much of the reef structure.

They generally occur in clear, tropical or semi-tropical seas to a depth of approximately 100 meters (328 feet). Coral reefs fringe approximately one sixth of the world's coastlines and are the biologically richest of all shallow-water marine ecosystems.

They support as many as 1 million species of animals and plants, but only a small fraction have been described. Among the best known groups are at least 5,000 species of fish, over 10,000 species of mollusk and more than 800 species of reef-building corals. Approximately 30 percent of marine fish species occur on coral reefs.

## WHY ARE CORAL REEFS IMPORTANT?

The majority of the world's estimated 284,000 km<sup>2</sup> (110,000 mi<sup>2</sup>) of coral reefs—an area about the size of the U.S. state of Nevada, or half the size of France—lie within the waters of developing countries, and support the livelihoods of millions of people. They supply seafood, building materials, sources for medicinal products, and draw in much needed tourism revenue. Every year tens of millions of tourists dive or snorkel on coral reefs worldwide.

Many Caribbean countries gain most of their foreign earnings from such tourism, and fees levied on tourists support a growing number of marine parks throughout the region. In the Florida Keys alone, reef tourism has been valued at \$1.6 billion per year.

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## 1. PHILIPPINES

**Area & Location:** Approximately 22,000 km<sup>2</sup> (8,494 mi<sup>2</sup>) in the heart South-East Asia's "coral triangle," the most biologically diverse region on Earth for coastal biodiversity that includes the nations of Indonesia, Philippines, Papua New Guinea, Australia, and southernmost Japan

**Key Threats:** Destructive fishing methods using explosives and poison, excessive fishing, pollution runoff from logging, agriculture and urban development

**Illustrative Species:** The Philippine imperial volute, *Aulica imperialis*, a snail restricted to the southern Philippines, and featured on its one centavo coin. It is intensively exploited for the ornamental shell trade.

**Prognosis for Protection:** The Philippines is largest and most species-rich of the coral reef hotspots, and is also a terrestrial biodiversity hotspot. While some of the remote reefs remain in relatively good condition, the Philippines coral reefs are the most highly threatened by severe pressure from people. More than 90 percent of adjacent forests have been logged. Development of many small, community-based marine reserves are showing great promise in the Philippines, but they will need to be larger and have stronger enforcement.

## 2. GULF OF GUINEA ISLANDS

**Area & Location:** Among the four islands (Annobón, Bioco, São Tomé and Príncipe) of the Gulf of Guinea, off the West African coast. The exact area of reef is unknown, but is likely to be less than 200km<sup>2</sup> (77 mi<sup>2</sup>).

**Key Threats:** Coastal development, sediment pollution from logging, over-fishing, proposed coral harvesting business

**Illustrative Species:** The west African endemic coral genus *Schizoculina*. *Schizoculina africana* and *S. fissipara* are endemic to the region and are adapted to Guinean waters and very low salinities from rivers flowing into the Gulf.

## 8. CAPE VERDE ISLANDS

**Area & Location:** Approximately 200 km<sup>2</sup> (77 mi<sup>2</sup>) in the mid-Atlantic off the West African coast

**Key Threats:** Coastal development, pollution from land clearing and agriculture, and over-fishing

**Illustrative Species:** Lubbock's Chromis (*Chromis lubbocki*)

**Prognosis for Protection:** While there are no true coral reefs in Cape Verde because the waters are too cool to support reef growth, there are coral-rich communities on rocky reefs in several places. Very little conservation activity at present but prospects are good for protection if action is taken soon.

## 9. WESTERN CARIBBEAN

**Area & Location:** More than 4,000 km<sup>2</sup> (1,544 mi<sup>2</sup>) of reefs from eight countries extending from the Mexican Yucatan Peninsula to Colombia

**Key Threats:** Epidemic diseases and coral bleaching from global warming

**Illustrative Species:** The splendid toadfish, *Sanopus splendidus*, restricted to the tourist destination of Cozumel Island off the Mexican coast

**Prognosis for Protection:** This hotspot borders the Mesoamerican terrestrial biodiversity hotspot. Intensive efforts are underway to protect reefs within this hotspot. Belize, for example, has committed to establishing a national network of marine protected areas. Greater effort needs to go into reducing the consequences of watershed development throughout the Caribbean to support the growing network of protected areas.

## 10. RED SEA AND GULF OF ADEN

**Area & Location:** The Red Sea and Gulf of Aden hotspot extends for 2,500 km (1,553 mi) from north to south, including the Gulfs of Aqaba and Suez

**Key Threats:** Coastal and industrial developments—including for tourism—in Jordan, Israel, Egypt and Saudi Arabia

**Illustrative Species:** The duskytail damselfish, *Chromis pelloura*, found only in the far northern Gulf of Aqaba

**Prognosis for Protection:** Although large stretches of Red Sea coastline have recently been developed, biodiversity there is more secure than in other hotspots. Large areas of the western and southern shores remain undeveloped.

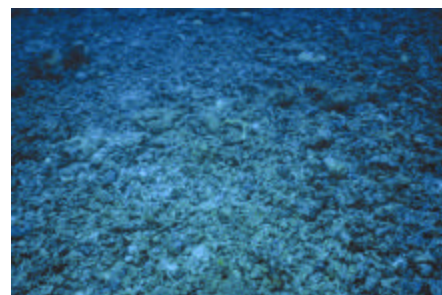
## WHY ARE CORAL REEFS IMPORTANT?

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Reefs also protect shorelines and communities from storms and erosion. Despite their extraordinary value, coral reefs are deeply threatened by human activities and global climate change. Worldwide, already 25 percent of coral reefs have been destroyed or badly degraded, and the prognosis for their survival is grim without a major global conservation effort.



Two views of a coral reef within the "coral triangle"—one healthy and teeming with life, the other laid bare after dynamite fishing.



## HOW TO LEARN MORE

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**Prognosis for Protection:** This hotspot is adjacent to the Guinean Forests of West Africa terrestrial biodiversity hotspot. There is very little marine conservation activity at present but prospects are good for protection if action is taken soon.

### 3. SUNDA ISLANDS

**Area & Location:** 12,600 km<sup>2</sup> (4,865 mi<sup>2</sup>) of the “coral triangle,” extending from the eastern tip of Sumatra in southern Indonesia, to the island of Kepulauan Tanimbar in the Timor Sea.

**Key Threats:** Pollution from land-based sources, intensive destructive fishing, a growing live reef fish trade

**Illustrative Species:** A cardinalfish, *Apogon komodoensis*

**Prognosis for Protection:** This coral reef hotspot borders the Sundaland and Wallacea terrestrial hotspots. Conservation efforts are underway, including in the Komodo Islands, which are renowned for their huge shoals of reef-associated pelagic fish. Still, pressures from human population and economic development needs are intense.

### 4. SOUTHERN MASCARENE ISLANDS

**Area & Location:** Approximately 1,000 km<sup>2</sup> (386 mi<sup>2</sup>) of reef surrounding the islands of Mauritius, La Reunion and Rodriguez in the southern Indian Ocean

**Key Threats:** A rapidly growing human population, pollution from intensive sugar cane production, coastal and agricultural development, and over-fishing

**Illustrative Species:** Mauritian Gregory damselfish, *Stegastes pelicieri*, restricted to waters less than 20 meters deep in Mauritius

**Prognosis for Protection:** This area is adjacent to the Madagascar terrestrial hotspot. Human impacts may have already led to the first extinctions, including the Mauritian green wrasse, *Anampses viridis* and the Reunion angelfish, *Holocanthus guezi*. There is a series of small marine parks around the islands, but pollution needs to be addressed.

### 5. EASTERN SOUTH AFRICA

**Area & Location:** Less than 200 km<sup>2</sup> (77 mi<sup>2</sup>)

**Key Threats:** Land-based sources of pollution, fishing and tourism development

**Illustrative Species:** The South African butterflyfish, *Chaetodon marley*

**Prognosis for Protection:** This area has rich coral communities encrusting sandstone reefs, which are bathed by the warm Agulhas current. This hotspot lies adjacent to the Cape Floristic Province terrestrial biodiversity hotspot.

A number of marine protected areas occur within this region but require greater enforcement and management strengthening.

### 6. NORTHERN INDIAN OCEAN

**Area & Location:** 10,000 km<sup>2</sup> (3,861 mi<sup>2</sup>) in the Maldives, Chagos and much of the Lakshadweep archipelagoes, as well as Sri Lanka

**Key Threats:** Global warming: In 1998 prolonged increases in sea surface temperatures devastated reefs, leading to upwards of 70 percent and sometimes more than 90 percent coral death across vast stretches of the hotspot. Global climate change continues to pose a threat, as do coral mining, over-fishing and ornamental fish collection.

**Illustrative Species:** The Colombo damselfish, *Pomacentrus proteus*

**Prognosis for Protection:** Prior to 1998, this hotspot boasted some of the most pristine coral reefs in the world. As global warming continues and sea levels rise, entire islands are at risk of disappearing in the Maldives. This hotspot is adjacent to the Western Ghats and Sri Lanka terrestrial biodiversity hotspot. Measures to mitigate the impacts of climate change are needed to accompany initiatives to protect reefs already underway throughout the hotspot.

### 7. SOUTHERN JAPAN, TAIWAN AND SOUTHERN CHINA

**Area & Location:** Over 3,000 km<sup>2</sup> (1,158 mi<sup>2</sup>) of reefs extending from Kyushu in Japan, through Taiwan to the coast of southern China

**Key Threats:** Shoreline development and conversion for agriculture and aquaculture, also global climate change, sea warming, and plagues of coral-eating Crown-of-Thorns starfish

**Illustrative Species:** *Acropora tanegashimensis*, one of many corals and reef species restricted to southern Japan

**Prognosis for Protection:** Reefs within this hotspot support one of the world’s richest accumulations of reef species found nowhere else. Symbolic of threats was a proposal in the 1980s to build a new airport runway across one of the best remaining coral reefs at Shiraho in Okinawa, Japan. The proposal was defeated after a long battle, but the runway is being built nearby. In addition, this part of the world has the greatest population and fishing pressures, especially from China. Efforts to protect reefs lag far behind development pressures. Without a rapid reversal of this position, prospects for marine life are bleak.

The top ten coral reef hotspots, those regions with high concentrations of unique species combined with a high degree of threat, are shown in red. The areas shown in yellow also represent areas with high concentrations of species.

