



## Coral Bleaching

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### Why in News?

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- The United Nations has reported that:
  - 70% of the Earth's coral reefs are threatened,
  - 20% have been destroyed with no hope for recovery,
  - 24% are under imminent risk of collapse, and
  - an additional 26% are at risk due to longer-term threats.
- According to a recent report, if stern measures to bring down the greenhouse gas emission levels are not adopted urgently, then Australia's Great Barrier Reef might be in danger of coral bleaching as frequently as every two years by 2034.
- Large scale coral bleaching in 2016 destroyed thousands of square kilometres of the Great Barrier Reef.
- Hawaii became the first U.S. state to put curbs on the sale of sunscreens containing oxybenzone and octinoxate, which can cause coral bleaching.

### What are Corals?

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- Corals are made up of genetically identical organisms called polyps. These polyps have microscopic algae called zooxanthellae living within their tissues.
- The corals and algae have a mutualistic relationship.
- The coral provides the zooxanthellae with the compounds necessary for photosynthesis.
- In return, the zooxanthellae supply the coral with organic products of photosynthesis, like carbohydrates, which are utilized by the coral polyps for synthesis of their calcium carbonate skeletons.
- In addition to providing corals with essential nutrients, zooxanthellae are responsible for the unique and beautiful colors of corals.
- They are also called the "rainforests of the seas".
- There are 2 types of corals:
  - Stony, shallow-water corals—the kind that build reefs.
  - Soft corals and deep water corals that live in dark cold waters.

## What is Coral Bleaching?

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- When corals face stress by changes in conditions such as temperature, light, or nutrients, they expel the symbiotic algae zooxanthellae living in their tissues, causing them to turn completely white. This phenomenon is called coral bleaching.
- The pale white colour is of the translucent tissues of calcium carbonate which are visible due to the loss of pigment producing zooxanthellae.
- Corals can recover if the stress-caused bleaching is not severe.
- Coral bleaching has occurred in the Caribbean, Indian, and Pacific oceans on a regular basis.

## Causes of Coral Bleaching?

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- **Rise in Sea Temperature:** Most coral species live in waters close to the warmest temperature they can tolerate i.e., a slight increase in ocean temperature can harm corals. El Nino elevates the sea temperature and destroys coral reefs.
- **Ocean Acidification:** Due to rise in carbon dioxide levels, oceans absorb more carbon dioxide. This increases the acidity of ocean water and inhibits the corals ability to create calcareous skeletons, which is essential for their survival.
- **Solar radiation and ultraviolet radiation:** Changes in tropical weather patterns result in less cloud cover and more radiations which induce coral bleaching.
- **Infectious Diseases:** Penetration of bacterium like vibrio shiloi inhibits photosynthesis of zooxanthellae. These bacteria become more potent with elevated sea temperatures.
- **Chemical Pollution:** Increased nutrient concentrations affect corals by promoting phytoplankton growth, which in turn supports increased numbers of organisms that compete with coral for space.
- **Increased Sedimentation:** Land clearing and coastal construction result in high rates of erosion and a higher density of suspended silt particles which can
  - smother corals when particles settle out (sedimentation),
  - reducing light availability (turbidity) and
  - potentially reducing coral photosynthesis and growth.
- **Human Induced Threats:** Over-fishing, pollution from agricultural and industrial runoff, coral mining, development of industrial areas near coral ecosystems also adversely impact corals.

## Consequences

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- Changes in coral communities can affect the species that depend on them, such as the fish and invertebrates that rely on live coral for food, shelter. Loss of such marine animals can disturb the entire food chain.
- Declines in genetic and species diversity may occur when corals die as a result of bleaching.
- Healthy coral reefs attract divers and other tourists. Bleached and degraded reefs can discourage tourism, which can affect the local economy.

- Coral bleaching can cause large shifts in fish communities. This can translate into reduced catches for fishers, which in turn impacts food supply and associated economic activities.
- Coral reefs protect coastlines by absorbing constant wave energy from the ocean, thereby protecting people living near the coast from increased storm damage, erosion and flooding.

## Way Forward

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- Solutions for protecting the future for coral must transcend social, economic and cultural boundaries.
- Halting unplanned coastal development would play a significant role in reversing the decline of reefs in some locations.
- Promoting sustainable fishing and providing opportunities for ecotourism can help conserve corals.
- There is a need to minimise the use of chemically enhanced fertilizers, insecticides, pesticides, and herbicides which are non degradable and harm corals.
- Harmful industrial waste must be treated before being disposed of in bodies of water.
- Water pollution should be avoided wherever possible by not dumping chemicals or oils in water bodies.
- Taking all possible measures to prevent actions that worsen global warming since Climate change is the greatest global threat to coral reef ecosystems.

## For Mind Map