Coral reefs

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Why is in news? Low human activity helps corals despite warm ocean

News Summary:

Simultaneously mitigating human impacts on land and sea reduced coral loss during an unprecedented marine heat wave in Hawaii and supported coral reef persistence after the heat wave, according to study.

The findings demonstrate the potential of **combined management strategies** to protect coral reefs.

Reasons for coral disturbance:

Frequently impacted by human activity on land and in the sea;

Land-based disturbances include wastewater pollution, and

Sea-based disturbances include overfishing.

Prolonged periods of warm ocean temperatures, known as **marine heat waves**, which can cause **coral bleaching and death**.

Also urban runoff, wastewater pollution and fishing restrictions.

Coral vulnerability:

Throughout the study period coral reef cover **increased in some areas, decreased or remained stable**.

Reefs with **mitigated land — and sea-based human impacts** showed increased coral cover before the heat wave and reduced coral loss during the heat wave.

Additionally, reefs with **more herbivorous fishes and exposure to fewer land-based human impacts** had increased reef-builder cover — more of the types of coral essential to reef growth — four years after the disturbance compared with reefs with reduced fish populations and exposure to more land-based human impacts.

The study suggested that **reducing land- and sea-based human impacts** results in a **three - to six fold greater probability of a reef** having high reef-builder cover four years after a disturbance.

The results reveal that **integrated land-sea management** could help achieve coastal ocean conservation goals and provide coral reefs with the best opportunity to persist in our changing climate.

Coral reefs:

Coral reefs are **underwater ecosystems** made up of the **skeletons of colonial marine invertebrates** known as coral.

Coral reefs are **one of the world's most biologically diverse marine ecosystems**.

Coral reefs are colonies of small living animals found in the oceans.

They are underwater formations **composed of coral polyps** bound together by **calcium carbonate**.

Coral reefs serve a vital function in marine ecosystems by **providing habitat for marine plants and wildlife**.

Coral is actually a living creature. Coral has a **symbiotic relationship with 'zooxanthellae,'** microscopic algae that live on coral [i.e., instead of living on the sea floor, the algae lives up on the coral, which is closer to the ocean surface and thus gets enough light].

Through their **photosynthetic activities**, zooxanthellae aid the coral in nutrient production.

The coral tissues themselves are not the beautiful colours of the coral reef, but rather clear (white). **Corals get their colour from the zooxanthellae** that live within their tissues.

In exchange, the host coral polyp provides its zooxanthellae with a safe environment to live in as well as a steady supply of carbon dioxide for photosynthetic processes.

Corals are classified into two types: **hard corals and soft corals**, which include sea fans and gorgonians. Only hard corals can form reefs.

The coral species **that build reefs** are known as **hermatypic, or "hard," corals** because they extract calcium carbonate from seawater to create a hard, durable exoskeleton that protects their soft, sac-like bodies.

Other species of **corals that are not involved in reef building** are known as "**soft" corals**. Soft corals, such as sea fingers and sea whips, are soft and bendable and often resemble plants or trees.

These corals do not have stony skeletons, but instead grow wood-like cores for support and fleshy rinds for protection.

Deep-sea corals live in **much deeper or colder oceanic waters and lack zooxanthellae**. Unlike their shallow water relatives, which rely heavily on photosynthesis to produce food, deep sea corals take in plankton and organic matter for much of their energy needs.

Conditions for growth of corals:

The **temperature of the water should not be below 20°C**. The most favourable temperature for the growth of the coral reefs is between 23°C to 25°C. The temperature should not exceed 35°C.

Corals can **survive only under saline conditions** with an average salinity between 27% to 40%.

Coral reefs **grow better in shallow water having a depth less than 50 m**. The depth of the water should not exceed 200m.

Factors Affecting Coral Reefs:

Extreme climate conditions: High temperature of water leads to the declination of these corals as they cannot survive in high temperature.

Overfishing: It is another major concern as it is leading to an ecological imbalance of the coral reefs.

Coastal development: Development of coastal infrastructure and tourist resorts on or close by these coral reefs causes significant damages.

Pollution: The toxic pollutants which are dumped directly into the ocean can lead to the poisoning of the coral reefs as it increases the nitrogen level of the seawater leading to an overgrowth of algae.

Sedimentation: Construction along the coasts and islands lead to soil erosion increasing the sediments in the river. As a result, it can smother corals by depriving them of the light needed to survive.

Importance of Coral Reefs:

They protect coastlines from the damaging effects of wave action and tropical storms.

They provide habitats and shelter for many marine organisms.

They are the source of nitrogen and other essential nutrients for marine food chains.

They assist in carbon and nitrogen-fixing.

They help with nutrient recycling.

The fishing industry depends also on coral reefs. Many fish spawn there, and juvenile fish spend time there before making their way to the open sea. The Great Barrier Reef generates more than 1.5 billion dollars annually for the Australian economy from fishing and tourism.

Coral reefs are also **key indicators of global ecosystem health**. They serve as an early warning sign of what may happen to other less sensitive systems, such as river deltas if climate change is not urgently addressed.

Coral reefs found in India:

India is recorded to have around 7,517 km of coastline but only 6,100 km represents the mainland coastline. The **three major types of coral reefs found in India** are **fringing, barrier and atolls**.

Coral reefs in India are found in a lot of areas including the **Gulf of Kutch, Gulf of Mannar, Palk Bay, Andaman & Nicobar and Lakshadweep Islands**.

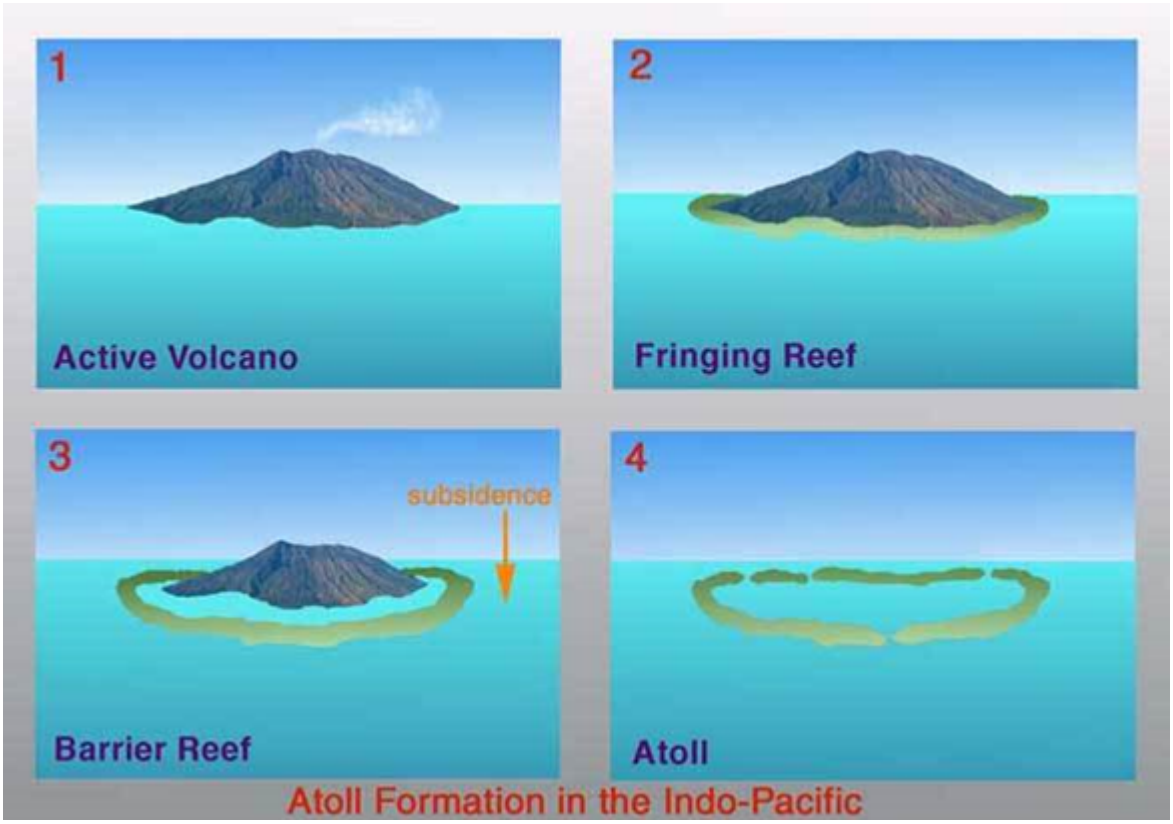
The Gulf of Kutch in the northwest has some of the most northerly reefs in the world.

Patches of coral reefs are also found in **Ratnagiri, Malvan and Redi, south Bombay and at the Gaveshani Bank** located in the west of Mangalore.

Corals running parallel to the shore are found at **Quilon near the Kerala coast to Enayem in Tamil Nadu**.

On the east coast, **between Parangipettai (south of Cuddalore) and Pondicherry**, corals are found in abundance.

When it comes to island corals, the Andaman and Nicobar Islands, and Lakshadweep Islands are rich with flourishing corals.



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