Corals in Thailand Getting Destroyed

For Prelims: Coral Reefs, Overfishing, Pollution, Zooxanthellae, Ocean acidification, Coral Bleaching, International Coral Reef Initiative, Cryomesh, Biorock Technology.

For Mains: Types of Corals, Significance of Coral Reefs, Initiatives to Protect Corals.

Why in News?

Recently, it is reported that a rapidly spreading disease, commonly known as **yellow band disease,** is killing **corals** over vast stretches of the sea floor of **Thailand.**

- Scientists believe **overfishing**, **pollution** **and rising water temperatures** because of climate change may be making the reefs more vulnerable to **yellow-band disease.**

What is Yellow Band Disease?

- Yellow-band disease - **named for the colour it turns corals before destroying them** -was first spotted decades ago and has caused widespread damage to reefs in the Caribbean. There is **no known cure.**
- The Yellow Band disease is caused by a **combination of environmental stressors, including increased water temperatures, pollution, and sedimentation**, as well as increased competition for space from other organisms.
    - These factors can weaken the coral and make it more susceptible to infection by pathogens, **such as bacteria and fungi.**
- The disease's impact **cannot be reversed, unlike the effects of** coral bleaching.

What are Coral Reefs?

- **About:**
    - **Corals** are marine invertebrates belonging to the class Anthozoa in the phylum **Cnidaria.**
        - They typically live in compact colonies of many identical individual polyps.
        - **Coral reefs** are underwater ecosystems made up of **colonies of coral polyps.**
    - Coral polyps live in a **symbiotic relationship** with a variety of **photosynthetic algae called** zooxanthellae**,** which live within their tissues.
        - These algae provide the **coral with energy through photosynthesis,** while the **coral provides the algae with a protected environment** and compounds, they need for growth.
- **Types of Corals:**
    - **Hard Corals:**
        - They extract **calcium carbonate** from seawater to build **hard, white coral exoskeletons.**
        - They are in a way the **engineers of reef ecosystems** and measuring the extent of hard coral is a widely-accepted metric for measuring the condition of coral reefs.
    - **Soft Corals:**

        - They attach themselves to such **skeletons and older skeletons** built by their ancestors.
        - Soft corals are typically **found in deeper waters** and are less common than hard corals.
- **Significance:**
    - **Ecological Importance:** Coral reefs are one of the most diverse and productive ecosystems on Earth, **providing habitat for a wide variety of plant and animal species.**
        - They also play a critical role in regulating the **planet's climate by absorbing carbon dioxide** and protecting coastlines from erosion and storm damage.
    - **Economic Importance:** Coral reefs support a variety of industries, including **fishing,** tourism**, and recreation.** They also provide resources for medicine and biotechnology.
    - **Climate Regulation**: Coral reefs act as natural buffers against the impact of climate change by **absorbing wave energy, protecting coastlines and reducing the impact of storms** and sea level rise.
    - **Biodiversity:** Coral reefs are home to a vast array of marine life, including **fish, sharks, crustaceans, mollusks** and many more. They are considered as the **rainforests of the sea.**
- **Threats:**
    - **Climate change:** Coral reefs are particularly vulnerable to the effects of climate change, which is **causing** ocean acidification **and** coral bleaching.
        - **Coral bleaching** occurs when coral polyps expel the algae (zooxanthellae) living in their tissues, causing the **coral to turn completely white.**
    - **Pollution:** Coral reefs are also **threatened by pollution,** including sewage, agricultural runoff, and industrial discharge.
        - These pollutants can cause coral death and disease, as well as reduce the overall health of the reef ecosystem.
    - **Overfishing:** Overfishing can disrupt the **delicate balance of coral reef ecosystems**, which can lead to the decline of coral populations.
    - **Coastal Development:** Coastal development, such as the **construction of ports, marinas, and other infrastructure,** can damage coral reefs and reduce the overall health of the reef ecosystem.
    - **Invasive Species:** Coral reefs are also threatened by invasive species, such as the **lionfish,** which can outcompete native species and disrupt the overall balance of the reef ecosystem.
- **Initiatives to Protect Corals**:
    - **Technological Intervention:**
        - **Cyromesh**: Storage of the coral larvae at -196°C and can be later reintroduced to the wild
        - **Biorock:** Creating artificial reefs on which coral can grow rapidly
    - **Indian:**
        - **National Coastal Mission Programme**
    - **Global:**
        - **International Coral Reef Initiative**
        - **The Global Coral Reef R&D Accelerator Platform**

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Coral Reefs

(Rainforests of the seas)

Drishti IAS

About

- **Large underwater structures** – made of skeletons of **colonial marine invertebrates 'coral'** – individually called **polyp**
- **Symbiotic** Relationship with **algae 'zooxanthellae'** (responsible for beautiful colours of corals)
- Support over 25% of marine biodiversity

Hard Corals vs Soft Corals

- **Hard Corals** - Rigid skeleton **made of $CaCO_3$ - reef-building** corals
- **Soft Corals** - Non reef-building

Great Barrier Reef (Australia)

- Largest Coral Reef in the World
- World Heritage Site (1981)
- Endures Mass Coral Bleaching

Corals in India

- Present in the areas of Gulf of Kutch, Gulf of Mannar, Andaman & Nicobar, Lakshadweep Islands and Malvan

Significance

- Coral reefs **protect coastlines from storms/erosion**, provide jobs, offer opportunities for recreation
- Source of **food/medicines**

Threats

- **Natural:** Temperature, Sediment Deposition, Salinity, pH, etc.
- **Anthropogenic:** Mining, Bottom Fishing, Tourism, pollution, etc.

Coral Bleaching

- Corals under stress - expel algae – thus turning white (bleached)
- Bleached corals - not dead – but, more risk of starvation/disease

Initiatives to Protect Corals

Technology

- Cyromesh: Storage of the coral larvae at (-196°C) - Can be later reintroduced to the wild
- Biorock: Creating artificial reefs on which coral can grow rapidly

Global

- International Coral Reef Initiative
- The Global Coral Reef R&D Accelerator Platform

Indian

National Coastal Mission Programme

UPSC Civil Services Examination, Previous Year Question (PYQ)

Prelims

Q. 1 "Biorock technology" is talked about in which one of the following situations?

(a) Restoration of damaged coral reefs
(b) Development of building materials using plant residue
(c) Identification of areas for exploration/extraction of shale gas
(d) Providing salt licks for wild animals in forests/protected areas

Ans: (a)

Q.2 Which of the following have species that can establish a symbiotic relationship with other organisms? (2021)

1. Cnidarians
2. Fungi
3. Protozoa

Select the correct answer using the code given below.

(a) 1 and 2 only
(b) 2 and 3 only
(c) 1 and 3 only
(d) 1, 2 and 3

Ans: (d)

Q.3 Consider the following statements: (2018)

1. Most of the world’s coral reefs are in tropical waters.
2. More than one-third of the world’s coral reefs are located in the territories of Australia, Indonesia and Philippines.
3. Coral reefs host far more number of animal phyla than those hosted by tropical rainforests.

Which of the statements given above is/are correct?

(a) 1 and 2 only
(b) 3 only
(c) 1 and 3 only
(d) 1, 2 and 3

Ans: (d)

Q.4 Which of the following have coral reefs? (2014)

1. Andaman and Nicobar Islands
2. Gulf of Kachchh
3. Gulf of Mannar
4. Sunderbans

Select the correct answer using the code given below:

(a) 1, 2 and 3 only
(b) 2 and 4 only
(c) 1 and 3 only
(d) 1, 2, 3 and 4

Ans: (a)

Mains

Q. Assess the impact of global warming on the coral life system with examples. **(2019)**

Source: TH