PLUTUS IAS

CURRENT AFFAIRS

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FOURTH GLOBAL MASS CORAL BLEACHING EVENT

THIS ARTICLE COVERS 'DAILY CURRENT AFFAIRS' AND THE TOPIC DETAILS "CORAL BLEACHING". THIS TOPIC IS RELEVANT IN THE "ENVIRONMENT" SECTION OF GS3 IN THE UPSC CSE EXAM.

WHY IN THE NEWS?

The US National Oceanic and Atmospheric Administration(NOAA) has noted that the fourth global mass coral bleaching event has been triggered by extraordinary ocean temperatures.

The great barrier reef in Australia, the largest in the world is most affected by severe bleaching.

ABOUT CORAL REEFS

- Coral reefs are underwater structures formed by calcium carbonate secreted by corals. Corals are tiny, soft-bodied organisms related to sea anemones and jellyfish. They live in colonies and form hard exoskeletons as they grow. These exoskeletons accumulate over time, creating the complex structures we know as coral reefs.
- Coral reefs are referred to as the "**rainforests of the sea**" due to their high biodiversity and the crucial role they play in supporting marine ecosystems. They provide habitats for a vast array of

marine life, including fish, crustaceans, mollusks, and many other organisms. Additionally, coral reefs protect coastlines from erosion by acting as natural barriers against waves and storms.

- However, coral reefs are highly sensitive to environmental changes, such as rising sea temperatures, pollution, and ocean acidification. These factors often lead to coral bleaching, a phenomenon where corals expel the algae living in their tissues, causing them to turn white and potentially die. Protecting coral reefs is essential for maintaining marine biodiversity and the health of our oceans.

WHAT IS CORAL BLEACHING?

Coral bleaching is a phenomenon in which corals lose their vibrant colors due to the expulsion of symbiotic algae living within their tissues. These algae, called zooxanthellae, provide corals with energy through photosynthesis and contribute to their vibrant colors. When corals are stressed by environmental factors such as high water temperatures, pollution, or changes in water chemistry, they expel the algae, causing them to turn white or pale.

Several factors can trigger coral bleaching:

1. **High Water Temperatures**: Elevated sea temperatures, particularly during periods of prolonged heat stress, can cause corals to bleach. Warmer temperatures stress the corals, leading them to expel the zooxanthellae.
2. **Pollution**: Pollution from sources such as agricultural runoff, sewage, and coastal development can degrade water quality and stress corals, making them more susceptible to bleaching.
3. **Ocean Acidification**: Increasing levels of carbon dioxide in the atmosphere can lead to ocean acidification, which can weaken coral skeletons and make corals more vulnerable to bleaching.
4. **Physical Damage:** Physical damage from factors such as boat anchors, fishing gear, and coastal construction can stress corals and increase their susceptibility to bleaching.

When corals bleach, they are not necessarily dead, but they are under increased stress and more vulnerable to mortality. If the stressful conditions persist, bleached corals may eventually die. Mass bleaching events, where large numbers of corals bleach simultaneously across extensive reef systems, can have devastating consequences for coral reef ecosystems, leading to widespread coral mortality and ecosystem decline.

Coral bleaching is a significant concern for coral reef conservation, as it is increasingly occurring at higher frequencies and severities due to climate change and human activities. Mitigating climate change, reducing pollution, and implementing sustainable management practices are essential for protecting coral reefs and preventing further bleaching events.

OTHER CHALLENGES POSED TO CORALS

- **Ocean Acidification**: Increasing levels of carbon dioxide in the atmosphere lead to ocean acidification, which can weaken coral skeletons and hinder coral growth and reproduction.
- **Overfishing**: Overfishing of key reef species, such as herbivorous fish and invertebrates, can disrupt ecological balance and degrade coral reef health. Removing herbivores can lead to overgrowth of algae, which can smother corals and inhibit their growth.
- **Invasive Species:** Invasive species, such as crown-of-thorns starfish, can prey on corals and contribute to reef degradation by causing outbreaks that lead to widespread coral mortality.
- **Sedimentation**: Excessive sediment runoff from coastal development, deforestation, and erosion can smother corals, reduce light penetration, and hinder coral growth and reproduction.
- **Climate Change**: Climate change exacerbates many of the threats facing coral reefs, including coral bleaching, ocean acidification, and more frequent and severe storms. Rising sea temperatures disrupt the symbiotic relationship between corals and zooxanthellae, leading to bleaching events.
- **Illegal Trade:** Illegal collection of coral for the aquarium trade and for use in jewelry and decorative items can deplete coral populations and disrupt reef ecosystems.

WAY FORWARD

The way forward to protect and conserve coral reefs involves a multi-faceted approach that addresses the various threats facing these ecosystems. Here are some key strategies:

1. **Mitigating Climate Change**: Addressing the root cause of coral bleaching and ocean acidification requires global efforts to reduce greenhouse gas emissions. This includes transitioning to renewable energy sources, improving energy efficiency, and implementing policies to limit carbon emissions.
2. **Marine Protected Areas (MPAs)**: Establishing and effectively managing marine protected areas can help conserve coral reef ecosystems by reducing fishing pressure, protecting critical habitats, and enhancing ecosystem resilience. MPAs should be designed based on scientific evidence and involve stakeholders in their management.
3. **Sustainable Fisheries Management:** Implementing sustainable fishing practices, such as regulating fishing quotas, protecting spawning grounds, and promoting selective fishing methods, can help maintain fish populations and preserve the ecological balance of coral reef ecosystems.
4. **Pollution Reduction:** Implementing measures to reduce pollution from land-based sources, such as improving sewage treatment, regulating agricultural runoff, and reducing plastic pollution, can improve water quality and reduce stress on coral reefs.
5. **Integrated Coastal Zone Management:** Adopting integrated coastal zone management approaches that consider the interactions between land and sea can help minimize coastal development impacts, reduce sedimentation, and protect coral reef habitats.
6. **Community Engagement and Education**: Engaging local communities in coral reef conservation efforts through education, awareness campaigns, and participatory management approaches can foster stewardship and support sustainable resource use practices.

7. **Research and Monitoring:** Continued research and monitoring of coral reef ecosystems are essential for understanding the drivers of coral reef decline, identifying priority conservation areas, and evaluating the effectiveness of conservation measures.
8. International Cooperation: Collaboration among governments, non-governmental organizations, researchers, and local communities is crucial for addressing transboundary issues, sharing knowledge and best practices, and mobilizing resources for coral reef conservation.

By implementing these strategies in a coordinated and holistic manner, we can work towards safeguarding coral reef ecosystems for future generations and ensuring their ecological, economic, and cultural value persists.

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ARTEMIS ACCORD

THIS ARTICLE COVERS 'DAILY CURRENT AFFAIRS' AND THE TOPIC DETAILS OF "ARTEMIS ACCORD". THIS TOPIC IS RELEVANT IN THE "SCIENCE AND TECHNOLOGY" SECTION OF THE UPSC CSE EXAM.

WHY IN THE NEWS?

Most recently, Slovenia and Sweden joined the ranks of nations signing the Artemis Accords, becoming the 39th and 38th countries, respectively, to do so.

WHAT IS ARTEMIS' ACCORD?

- The Artemis Accords, **initiated by the U.S. State Department and NASA** along with seven other founding nations – Australia, Canada, Italy, Japan, Luxembourg, the United Arab Emirates, and the United Kingdom – in 2020, **aim to establish universal principles governing the peaceful exploration and utilisation of outer space, including the moon, Mars, comets, and asteroids.**
- These accords are based on the framework provided by the Outer Space Treaty of 1967, a foundational document in international space law established under the United Nations.
- The treaty underscores the notion of space as a shared resource for humanity, **prohibits the national appropriation of celestial bodies**, and promotes the peaceful exploration and utilisation of space.

KEY PRINCIPLES OF ARTEMIS ACCORD

- **Transparency in Space Activities:** The Accords call for signatories to register their space objects with the United Nations Office for Outer Space Affairs. This promotes transparency in space activities and reduces the risk of collisions between spacecraft or debris in orbit. Maintaining a clear picture of objects in space is crucial for ensuring the safety of space exploration endeavours.
- **Transparency and Knowledge Sharing:** The Accords advocate for open communication between signatories. This includes sharing scientific data and best practices, fostering collaboration and accelerating scientific progress. By openly sharing information, participating

nations can learn from each other's experiences, leading to more efficient and successful missions.

- **Peaceful Purposes:** The Accords prioritise the use of space exploration for peaceful objectives only. This aligns with the Outer Space Treaty of 1967, a foundational document in space law, which prohibits military activities on celestial bodies. The Artemis Accords reinforce this commitment, fostering a spirit of cooperation in space.
- **Interoperability:** To ensure seamless collaboration on future space projects, the Accords call for the development of compatible systems and standards. This could involve establishing common protocols for communication, docking procedures, and data exchange between space agencies. By working towards interoperability, signatories can avoid technical hurdles and work together more effectively.
- **Responsible Resource Utilisation:** As space exploration expands, the potential to extract resources from celestial bodies becomes more relevant. The Artemis Accords acknowledge this by establishing a framework for the responsible utilisation of these resources. This ensures that resource extraction is conducted sustainably and equitably, preventing conflicts and safeguarding the long-term future of space exploration.
- **Mutual Assistance:** The Accords emphasise the importance of rendering aid to astronauts in need, upholding a longstanding tradition of spacefaring nations supporting each other. This principle ensures the safety and well-being of astronauts venturing into the unknown depths of space.

ABOUT OUTER SPACE TREATY

- The **Outer Space Treaty**, adopted by the United Nations in 1967, **primarily focuses on ensuring the peaceful use of outer space and prohibits the placement of nuclear weapons in space.** It also includes provisions related to managing space debris and ensuring the return of space objects to Earth, as well as addressing damage caused by space objects to other space assets or on Earth.
- The Rescue and Return Agreement of 1968, previously known as the **'Agreement on the Rescue of Astronauts, the Return of Astronauts and the Return of Objects Launched into Outer Space' (ARRA),** outlines the responsibilities of states to assist and rescue astronauts in distress and promptly return them to their launching State. It also addresses the recovery of space objects.
- The **Liability Convention of 1972, formally titled the Convention on International Liability for Damage Caused by Space Objects, counts most space-faring countries as signatories.** This convention serves as one of several international agreements complementing the Outer Space Treaty, providing a framework for countries' behaviour in space.
- Furthermore, the Registration Convention of 1975, known as the Convention on Registration of Objects Launched into Outer Space, aims to establish means and procedures for identifying objects launched into outer space (space objects) and facilitating their registration.

NEED FOR ARTEMIS ACCORD.

- **Global Cooperation:** Space exploration has evolved from a competition among superpowers to a collaborative effort involving multiple nations and private entities. The Artemis Accords provide a platform for nations to cooperate and coordinate their activities in space, ensuring mutual benefit and advancing scientific knowledge for all humanity.
- **Peaceful Exploration:** With the increasing interest in lunar and planetary exploration, it's crucial to establish clear guidelines for peaceful coexistence and cooperation in space. The

Artemis Accords emphasise the peaceful use of outer space, mitigating the risk of conflict and promoting a shared vision for exploration.

- **Regulatory Framework:** As space activities become more diverse and complex, there's a growing need for a regulatory framework to address issues such as resource utilisation, environmental protection, and space traffic management. The Artemis Accords lay down principles and guidelines to govern these activities, promoting responsible behaviour and sustainability in space.
- **Protection of Heritage:** The Artemis Accords recognise the importance of preserving sites and artefacts of historical or cultural significance in space, such as lunar landing sites. By protecting these heritage sites, the accords ensure that future generations can study and appreciate humanity's achievements in space exploration.
- **Transparency and Accountability:** Transparency and openness are essential for building trust among spacefaring nations and promoting collaboration. The Artemis Accords encourage nations to share information openly about their space activities, fostering transparency and accountability in the international space community.
- **Legal Certainty:** By adhering to the principles outlined in the Artemis Accords, nations can benefit from legal certainty and predictability in their space activities. Clear guidelines help prevent misunderstandings and conflicts, allowing nations to pursue their exploration goals with confidence.

PRELIMS PRACTISE QUESTION

Q1. Consider the following statements:

1. The primary goal of the Artemis Accords is to limit access to space resources.
2. It was initiated by NASA and the European Space Agency
3. The Artemis Accords is built upon the Outer Space Treaty of 1967

How many of the statements above are correct?

(a) Only one
(b) Only two
(c) All three
(d) None

Answer: C

Q2. What is the primary purpose of the Liability Convention of 1972?

(a) Establishing guidelines for space debris management
(b) Ensuring the peaceful use of outer space
(c) Addressing liability for damage caused by space objects
(d) Promoting global cooperation in space exploration

Answer: C

MAINS PRACTISE QUESTION

Q1. In what ways do the Artemis Accords promote the peaceful use of outer space, and how do they align with existing international treaties like the Outer Space Treaty of 1967?