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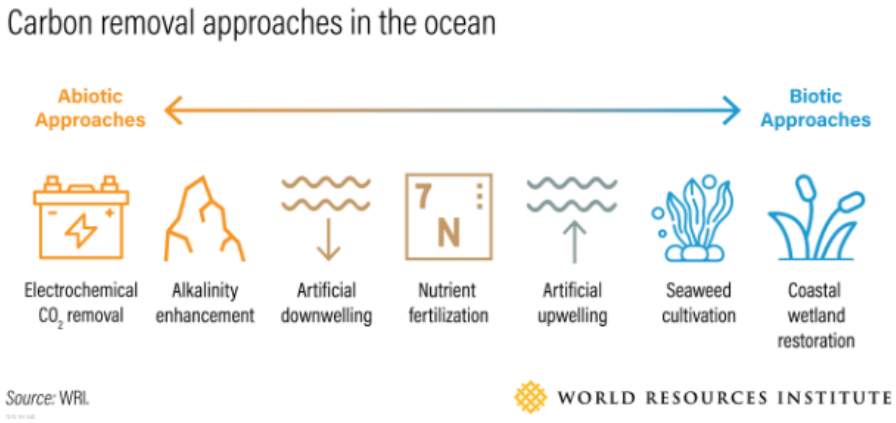
Ocean Based Carbon Removal

A new study throws light on the limitations of the current approaches of removing carbon dioxide from the ocean.

- **Carbon sequestration by Ocean** – It has already *absorbed 30% of the CO2* and *90% of excess heat* caused by human activities.

  In total, the ocean holds around 42 times more carbon than the atmosphere.

- **Approaches** – By enhancing or accelerating natural biological or chemical processes that sequester carbon in the ocean.



- **Abiotic approaches** – They *harness the physical or chemical* properties of the ocean to remove CO2 from the air.
  - Alkalinity enhancement, electrochemical CO2 removal and artificial downwelling
- **Biotic approaches** – They *leverage photosynthesizing organisms* in seawater to take up CO2 and *store as biomass*.
  - Seaweed cultivation, Ocean fertilization, artificial upwelling and coastal wetland restoration.

Abiotic Approaches in Marine CO2 Removal
• **Alkalinity enhancement** – *Adding certain minerals* to seawater enable more atmospheric CO2 to dissolve into the ocean. • **Electrochemical CO2 removal –** It *use electricity* to mimic alkalinity enhancement, or directly extract CO2 from seawater for storage on land. • **Artificial downwelling** – It *accelerates natural currents* that carry carbon-rich surface water into the deep ocean in the Arctic and Antarctic.
Biotic Approaches in Marine CO2 Removal

• **Seaweed cultivation** – They are cultivated and then *sunk to the deep ocean* storing a portion of the carbon-rich biomass.
• **Ocean Fertilization** – *Nutrients like iron can be added* to the ocean to spur phytoplankton growth.
• **Artificial upwelling** – It is same as ocean fertilization, but does so by moving deeper, *nutrient-rich water to the surface*.

- **Challenges** – The limited understanding of basic ocean processes is hindering progress in marine CO2 removal.
- Absorbing excess CO2 and heat is causing ocean warming, acidification, oxygen loss; changing currents and nutrient cycling; and imperilling plants and animals essential to marine ecosystems.
- They compromise the ocean's ability to provide food, support livelihoods and insulate us from the worst effects of climate change.

References

1. The New Indian Express | Concerns in Marine CO2 Removal
2. WRI| Ocean based CO2 Removal

Contributions of Birsa Munda

A tribute was recently paid to revolutionary tribal leader Birsa Munda on his 124th death anniversary.

- He belongs to ***Munda tribe***, a tribe of nomadic-hunters-turned-farmers who lived in the Chotanagpur region of Jharkhand.
- He is also known as ***'Dharti ka Abba and 'Bhagwaan Birsa'***, as he achieved a God-like status among his followers.
- **Social reformer** – He fought *against superstition, animal sacrifice* and alcoholism.
- **Unified the tribal community** – He started the *faith of "Birsait*" to challenge the British conversion activities through missionaries.
- It attracted the members of Munda and Oraon tribal communities and thereby unified the tribal community under a single umbrella.
- **Mobilized the masses** – He had put examples of their ancestors and their burning patriotism to motivate the mass people.
- **Fought for Tribal land rights** – His organisational skill, motivating the masses to regain freedom from the power grabbers like the Thikadars, Zamindars and money-lenders and restoration of full ownership rights as tillers of the soil.
- He demanded tribal farmers to boycott 'beth begari system' (forced labour).
- **Spearheaded tribal movement** – He led the movement called 'Ulgulan', organising the Adivasis against the land settlement system imposed by the British.

The Ulgulan Movement or The Great Tumult

• **Background** – Munda tribes follows *Khuntkatti system*, a joint ownership of land by tribal lineage.
• They clear forests to make the land cultivable, and the entire clan, rather than an individual, owns the land.
• **Causes of revolt** – The *Permanent Settlement Act (1793)* introduced the zamindari system and created land-owning zamindars who were seen as *outsiders or dikus* by indigenous residents.
• It allowed the dikus to claim ownership rights of tribal lands which displaced the indigenous dwellers.
• **Aim of the revolt** – To resist British oppression, exploitation by landlords, and the imposition of alien laws and taxes on tribal people.
• **Impact** – Though it was eventually suppressed by the British, it inspired later movements for tribal rights and land reforms.
• The government *repealed of the begar system*, and led to the *Tenancy Act (1903)* which recognised the khuntkhatti system.
• The *Chotanagpur Tenancy Act (1908)* later banned the passage of tribal land to non-tribal folks.

Sardari Ladai (1858-90)

- An agrarian discontent against the imposition of beggars (forced labor) and illegal enhancement of rent by the intermediaries.
- **Led by** – The "Sardars" of the Munda and Oraon tribes.
- **Approaches** – Peaceful means like petition, prayers and protest to demand justice from the colonial regime.
- **Significance** – It prepared the ground for Birsa Munda's rebellion.

References

1. The New Indian Express | Contribution of Birsa Munda
2. Odisha.Gov| Birsa Munda – The Great Hero of the Tribals

Indian House Crows

The Kenyan government has launched a campaign against Indian House Crows, aiming to eliminate one million of them by the end of 2024.

- **Taxonomy** – It belongs to the family 'Corvidae'.
    - **Scientific Name** – Corvus splendens
- **Nativity** – Indian subcontinent.
- **Distribution** – Colonized urban and suburban areas in many parts of *Asia, Africa, and the Middle East*.

> *The house crow, also known by various names such as the Indian crow, grey-necked crow, Ceylon crow and Colombo crow originated from India and other parts of Asia but has since spread to many parts of the world, aided by shipping activities.*

- **Features** – They are medium-sized birds known for their adaptability and intelligence.
- They have a slightly glossy appearance.
- **Challenges in Kenya** – Their *exponential rise* due to their remarkable adaptability and association with human settlements.
- Being invasive they cause *problems for tourists, farmers*, and local avian species for decades.
- It led to significant d*ecrease in the population of small indigenous birds* on the Kenyan coast by destroying their nests and preying on their eggs and chicks.

Reference

Down to Earth| Impacts of Indian House crows in Kenya

COSIS

Recently, the ITLOS issued an advisory opinion on international climate change litigation requested by the COSIS.

> *International Tribunal for the Law of the Sea (ITLOS) is an independent judicial body established by the 1982 United Nations Convention on the Law of the Sea (UNCLOS).*

- **COSIS** – Commission of Small Island States on Climate Change and International Law, an *international commission* that have an *international legal personality.*
- **Formed by** – The Island nations of Antigua & Barbuda and Tuvalu on the eve of COP26 at Glasgow ***in 2021***.
- It entered into force upon signature by two or more states.
- **Aim** – To address the unique challenges faced by small island nations regarding climate change within the framework of international law.
- **Recognition** – It was *registered with the United Nations* (UN) in accordance with Article 102 of the Charter of the UN.
- **Members** – It is open to any member of the Alliance of Small Island States (AOSIS).
    - Antigua & Barbuda, Tuvalu, Palau, Niue, Vanuatu, St. Lucia, St. Vincent & the Grenadines, and St. Kitts & Nevis.
- **Mandate** – To promote and contribute rules and principles of international law *concerning climate change, protection and preservation of the marine environment* and their responsibility for injuries arising from internationally wrongful acts in respect of the breach of such obligations.
- **Activities** – It assists Small Island States in promoting its mandate.
- It shall be authorised to request *advisory opinions from the ITLOS* on any legal question within the svope of 1982 UN Convention on the Law of the Sea (UNCLOS).
- It may appoint experts and advisors as necessary.
- **Recent advisory by ITLOS** – The *Parties to UNCLOS have specific obligations* to take all necessary measures to prevent, reduce and control marine pollution from anthropogenic greenhouse gas emissions (GHG).

References

1. The Hindu| ITLOS gives advisory to COSIS
2. COSIS| Commission of Small Island States on Climate Change and International Law

Pathogens in Space

Researchers are studying multi-drug resistant pathogens on the International Space Station (ISS), which could have key applications for astronaut's health as well on Earth.

- **Organisation involved-** Indian Institute of Technology Madras (IIT Madras) and NASA's Jet Propulsion Laboratory (JPL).
- **The Jet Propulsion Laboratory (JPL)** *is a unique collaboration between NASA and Caltech.*
- ***Aim-*** *To study the behaviour, adaptation, and evolution of multi-drug resistant pathogens about* ***400-km above*** *the earth's surface at the International Space Station (ISS).*
- **The International Space Station (ISS)** *is a large space station assembled and maintained in low Earth orbit by a collaboration of five space agencies and their contractors: NASA (United States), Roscosmos (Russia), JAXA (Japan), ESA (Europe), and CSA (Canada).*
- **Key features of the research –** Studying *genomic adaptations of drug-resistant pathogens* can improve targeted treatments.
- Insights into pathogen persistence in spaces like *spacecraft and hospitals can help manage contamination.*
- Integrating *genomics, metagenomics, and metabolic modeling* can study microbial dynamics in various extreme environments.
- **Comprehensive study-** To understand the *genomic, functional, and metabolic enhancements observed in multidrug-resistant pathogens* with a particular focus on Enterobacter bugandensis, a prevalent nosocomial pathogen found on surfaces within the ISS.
- **Enterobacter bugandensis** *is a species of bacteria that belongs to the Enterobacter genus, which is commonly found in various environments including soil, water, and the gastrointestinal tracts of humans and animals.*

Reference

Business Standard | Pathogens in Space