



ENVIRONMENT

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Dear Students,

PT 365 documents comprehensively cover the important current affairs of last 1 year (365 days) in a consolidated manner to aid Prelims preparation.

In our endeavour to further enhance the document in the interest of the aspirants, following additions have been incorporated:



Summarised Infographics: Topics such as:

- Key information of major species.
- Key concepts like India's Nationally Determined Contributions, Biofuels, Article 6 of the Paris Agreement, etc.

have been summarised and added in form of interactive infographics to improve ease of understanding, provide for smoother learning experience and ensure enhanced retention of the content.



Compilation of Species and Protected Areas: Important Species and Protected Areas that have been in news are covered at the end of the documents for easier reading.



Thumbnails: Pictorial and interactive thumbnails of important information such as:

- Protection status of a species.
- Whether a Protected Area is recognised by CA|TS, UNESCO's Man and Biosphere Programme, etc.

have been added for easier recognition and quick revision of content.



Terms/Concepts in News: Each chapter includes a dedicated section highlighting key terms and concepts in news like Green Firecrackers, Gas Hydrates, etc., presented in a clear and concise manner for quick and efficient coverage.



Institutions/Organizations in News: Important information about major Institutions and Organizations has been provided in the form of infographic along with their reports/Indices.



Consolidated Maps: They have been added to provide geographical and contextual information about different places in news.



Quiz: QR based Smart quiz has been added to test the aspirant's learnings and understanding.

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1. BIODIVERSITY

1.1. WILDLIFE AND CONSERVATION

1.1.1. IUCN WORLD CONSERVATION CONGRESS

Why in the News?

International Union for Conservation of Nature (IUCN) World Conservation Congress 2025 took place in Abu Dhabi, UAE.

Key Resolutions at Member's Assembly

- Adoption of a '**Unite for Nature on the Path to 2045**'- 20-year Strategic Vision.
- Abu Dhabi Call to Action** to accelerate action across **5 key areas** – reaffirming nature as foundation of well-being, strengthening multilateralism, ensuring justice and inclusion, advancing knowledge and innovation, and scaling up resources for nature and climate action.
- Over 100 new members** including six states – Armenia, Tajikistan, Marshall Islands, Gabon, Tuvalu, and Zimbabwe.
- Motion advocating for a **just phase-out of fossil fuels** adopted for the **first** time.
- Wild animals recognised as climate-allies**, acknowledged as agents of nature-based solutions for climate resilience.
- First-ever World Summit of Indigenous Peoples and Nature** recognizing their role in biodiversity conservation.



**International Union for
Conservation of Nature**

Gland,
Switzerland

 **Genesis:** Founded in 1948, now the **world's largest and most diverse environmental network**.

 **Membership:** 1,400+ members (states, NGOs, research institutions). **India is a member.**

 **Governance:**

- ▷ **Members' Assembly of IUCN World Conservation Congress:** Highest governing body.
 - Held once every 4 years, the **IUCN World Conservation Congress** is hosted by one of IUCN's State Members.
- ▷ **IUCN Council:** serves as **principal governing body** between sessions of World Conservation Congress

 **Purpose:** It runs thousands of field projects around the world for resource management.

 **Reports:** IUCN Report on Protected Areas (released by IUCN World Commission on Protected Areas); IUCN World Heritage Outlook 4 etc.

Related News: India's National Red List Roadmap and Vision 2025–2030

- India unveiled it to strengthen Biodiversity Conservation.
- Vision:** To establish a **nationally coordinated and participatory red listing system** that reflects the true conservation status of Indian species of flora and fauna across India's diverse ecosystems.
- Scope:** **5-year initiative** aiming to assess the extinction risk of **~11,000 species**.
- Goal:** To publish **National Red Data Books** for both flora and fauna **by 2030**.
- Nodal Agencies:** Union Ministry of Environment, Forest & Climate Change

- Prepared by:** Zoological Survey of India (ZSI) and the Botanical Survey of India (BSI) in collaboration with IUCN, India and the Centre for Species Survival
- Internationally aligned:** Convention on Biological Diversity (CBD) and the Kunming-Montreal Global Biodiversity Framework (KMGBF), using Red List assessments.

1.1.1.1. KEY INSTRUMENTS OF IUCN IN NEWS

Instrument	Details																		
IUCN Red List of Threatened Species	<ul style="list-style-type: none"> Established in 1964, divides species into 9 categories Updated at least twice each year. Recent Update to IUCN Red List: <ul style="list-style-type: none"> Global: 3 species of Arctic seal (keystone species) moved closer to extinction; Green Sea Turtle, a keystone species, improved in status from Endangered to Least Concern. India: Conservation status of 12 Indian bird species modified, uplisting 4 species- <ul style="list-style-type: none"> > Indian Courser, Indian Roller and Rufous-tailed Lark uplisted to Near Threatened > Long-billed Grasshopper-warbler uplisted to Endangered. Others: First-ever Policy on Synthetic Biology and Nature Conservation, Recognizes ecocide (deliberate environmental harm) as international crime under the International Criminal Court. <div style="text-align: center;"> <p>Categories Under IUCN Red List</p> <p>Increasing risk of extinction</p> <table border="1"> <thead> <tr> <th>Category</th> <th>Description</th> </tr> </thead> <tbody> <tr> <td>Data Deficient (DD):</td> <td>not enough information on abundance or distribution to estimate its risk of extinction.</td> </tr> <tr> <td>Least Concern (LC):</td> <td>population is stable enough that it is unlikely to face extinction in the near future.</td> </tr> <tr> <td>Near Threatened (NT):</td> <td>close to qualifying or likely to qualify for a threatened category in the near future.</td> </tr> <tr> <td>Vulnerable (VU):</td> <td>facing a high risk of extinction in the wild.</td> </tr> <tr> <td>Endangered (EN):</td> <td>facing a very high risk of extinction in the wild.</td> </tr> <tr> <td>Critically Endangered (CR):</td> <td>facing extremely high risk of extinction in the wild.</td> </tr> <tr> <td>Extinct in the Wild (EW):</td> <td>known only to survive in captivity, cultivation or well outside its natural range</td> </tr> <tr> <td>Extinct (EX):</td> <td>no reasonable doubt that the last individual has died.</td> </tr> </tbody> </table> </div>	Category	Description	Data Deficient (DD):	not enough information on abundance or distribution to estimate its risk of extinction.	Least Concern (LC):	population is stable enough that it is unlikely to face extinction in the near future.	Near Threatened (NT):	close to qualifying or likely to qualify for a threatened category in the near future.	Vulnerable (VU):	facing a high risk of extinction in the wild.	Endangered (EN):	facing a very high risk of extinction in the wild.	Critically Endangered (CR):	facing extremely high risk of extinction in the wild.	Extinct in the Wild (EW):	known only to survive in captivity, cultivation or well outside its natural range	Extinct (EX):	no reasonable doubt that the last individual has died.
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IUCN Green Status of Species	<ul style="list-style-type: none"> "Green Lists" Proposed by IUCN at 2012 World Conservation Congress and launched in 2021. <ul style="list-style-type: none"> Green Status of Species assessment is optional part of Red List assessments. Purpose: <ul style="list-style-type: none"> To measure conservation success for species, ecosystems, and protected areas. Complement Red List which focuses on extinction risk. Highlight Conservation Success 8 Green Status Categories: Extinct in the Wild, Critically Depleted, Largely Depleted, Moderately Depleted, Slightly Depleted, Fully Recovered, Non-Depleted and Indeterminate. Over 100 IUCN Green Status of Species assessments on IUCN Red List. Green Score (0-100%): Indicates how close a species is to full recovery, a species is fully recovered if: 																		

	<ul style="list-style-type: none"> ○ Present in all parts of its historical range (including areas lost due to human impact). ○ Viable (not at risk of extinction) across its range. ○ Performs its ecological functions in all parts of its range.
Kenton R. Miller Award	<ul style="list-style-type: none"> ● Kaziranga Director becomes first Indian to receive IUCN's Kenton R. Miller Award for innovation in national parks. ● Constituted by: World Commission on Protected Areas (WCPA), one of six technical commissions of IUCN. ● Established in 2006 for Innovation in National Parks and Protected Area Sustainability. ● Honors individuals who show innovation and leadership in conserving national parks and protected areas. ● Presented every two years by the IUCN-WCPA.
IUCN Species Survival Commission (SSC)	<ul style="list-style-type: none"> ● Established in 1949, it is a science-based network of more than 10,500 volunteer experts. ○ India's renowned wildlife conservationist, Vivek Menon, has been elected as the new Chair of the IUCN Species Survival Commission (SSC) for the 2025-2029. ● Role: To provide information to IUCN on biodiversity conservation, the inherent value of species, their role in ecosystem health and functioning, etc.
IUCN World Heritage Outlook 4 report	<ul style="list-style-type: none"> ● It categorises Western Ghats and 2 national parks (NP) in India – Assam's Manas NP and West Bengal's Sundarbans NP as being of “significant concern”. ● Other findings <ul style="list-style-type: none"> ○ Only Khangchendzonga National Park remained ‘Good’ in Conservation Outlook Rating. ○ Sundarbans National Park: Witnessed Deterioration in its conservation outlook status from ‘Good with some Concerns’ to ‘Significant Concerns’ from 2020-2025.

1.1.1.2. GREEN STATUS ASSESSMENT FOR THE LION

Why in the news?

IUCN releases First Green Status Assessment for the Lion (*Panthera leo*).

About First Green Status assessment for the Lion

- **Lion's Green Status:** ‘Largely depleted’.
- **Extinct Regions:** North Africa and Southwest Asia.
- **Conservation Success:** Parts of **West and Southern Central Africa, South Africa**, and India.



Difference between Asiatic and African Lions		
Parameters	Asiatic Lion	African Lion
Current Habitat	Primarily Gir National Park, India	Sub-Saharan Africa (savannas/grasslands)
Mane (Males)	Sparser and shorter; ears are almost always visible.	Fuller and denser; often covers the ears and neck.
Belly Fold	A distinctive longitudinal skin fold along the belly (common).	Usually absent
Body Size	Slightly smaller than African lions.	Generally larger than Asiatic Lions.

Other Characteristics: No particular breeding season.

Conservation: 'Project Lion' announced on August 15, 2020; **Greater Gir Concept:** Expanding lion habitats beyond Gir to areas like Girnar, Pania, and Mitiyala.

Note: As per the amendments made under the '**Wild life (Protection) Amendment Act, 2022**', species that are covered under Appendices of CITES are now listed under **Schedule IV of the Act**.

Related News: Barda Wildlife Sanctuary

- Barda is emerging as a **second home for Asiatic Lions**
- Location:** Porbandar and Devbhumi Dwarka districts, Gujarat.
- Key Flora:** Gorad, Babul, Dhav, Rayan, Ber, Jamun, Amla, Dhudhlo, Bamboo etc.
- Key Fauna:** Sambar, chital, chinkara, etc.

1.1.2. UNESCO'S WORLD NETWORK OF BIOSPHERE RESERVES (WNBR)

Why in the news?

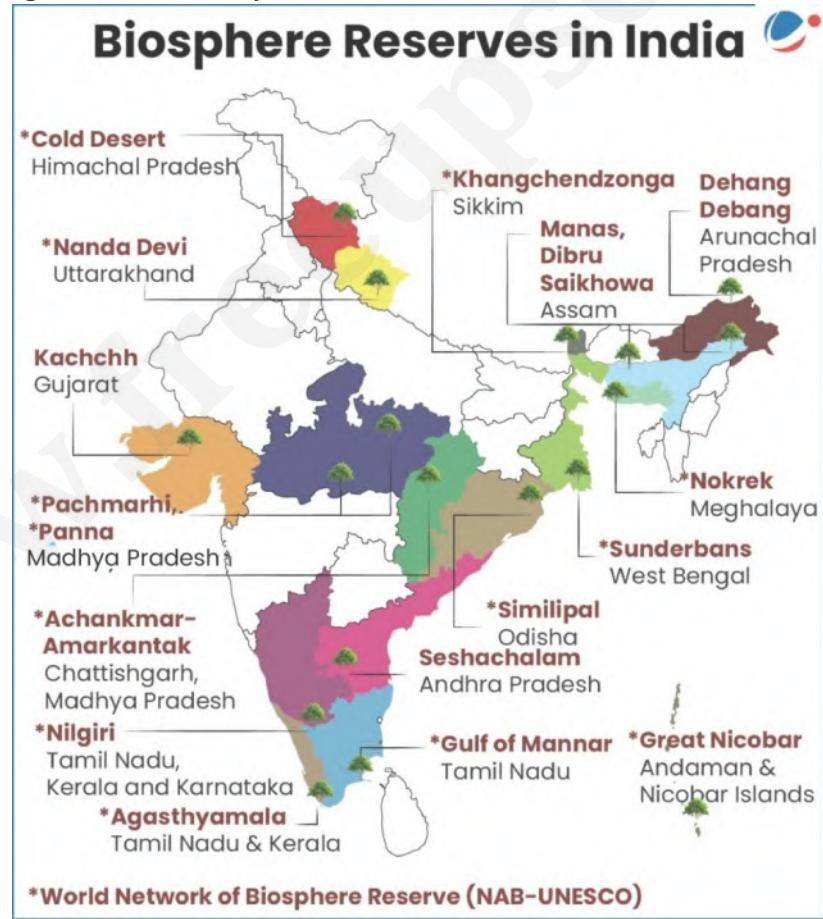
UNESCO designated the Cold Desert Biosphere Reserve in India to the UNESCO's World Network of Biosphere Reserves (WNBR).

About WNBR

- Launched in 1976, WNBR is managed by the **Man and the Biosphere (MAB) Programme of UNESCO**.
 - Launched in 1971, **MAB is an intergovernmental scientific programme** aiming to establish a scientific basis for enhancing the relationship between people and their environments.
- A network of **785 sites globally**, including **13 UNESCO Biosphere Reserves in India**.
- São Tomé and Príncipe**, a Central African island nation, has become the **first State to have its entire territory designated as a biosphere reserve**.

How are Biosphere reserves (BRs) designated under MAB?

- Designated by:** Director-General of UNESCO following decisions of the MAB International Coordinating Council (MAB ICC).
- Methodology used:** Seville Strategy for BRs and the Statutory Framework of the World Network of BRs
- Sites can be proposed by all Member States and Associate Members of UNESCO**
 - After designation, sites remain under the sovereign jurisdiction of states.
 - States can also remove a BR from the network by notifying the MAB Secretariat.
- Each BR undergoes a periodic review every 10 years** to assess its functioning and management effectiveness.
 - UNESCO can **withdraw designation** if a reserve fails to meet the required standards.



About Cold Desert Biosphere Reserve, Himachal Pradesh

- India's first high-altitude cold desert BR and **one of the coldest and driest ecosystems in UNESCO's WNBR.**
- Protected Areas:** Covers Pin Valley National Park, Chandratal and Sarchu & Kibber Wildlife Sanctuary.
- Biome:** Cold Desert biome with harsh climatic conditions, attributed to **two factors** – location on leeward side of Himalayas (making it a rain-shadow zone) and very **high elevation**.
 - In Himalayas, it stretches from **Ladakh** (Leh and Kargil Districts) in north to **Kinnaur** (Spiti valley and Kinnaur district in Himachal Pradesh) in **South**.
- Culture:** Distinct **Buddhist** culture dominates the region with presence of-
 - Gompas** (Buddhist monasteries), **Chorten** (remarkable type of stupas) and Mani Walls (long and thick platform like row of stones).
 - Buddhist Chanting of Ladakh**, inscribed on UNESCO's Representative List of the **Intangible Cultural Heritage of Humanity**.
- Fauna:** Snow Leopard, Himalayan Ibex, Blue Sheep, Himalayan Wolf, Golden Eagle etc.

1.1.3. WILDLIFE PROTECTION ACT (WPA), 1972

Why in the News?

Kerala becomes **first** state to introduce **amendments** to the **Wildlife Protection Act (WPA), 1972** aimed at easing the procedures for **killing wild animals** that pose threat to human.

About WPA, 1972

- Aim:** Protection of wild animals, birds and plants and matters connected therewith with a view to ensuring the ecological and environmental security of the country.
- 4 Schedules for Species Protection** (as per **2022 Amendment**) :
 - Schedule I:** Highest-level protected species of animals.
 - Schedule II:** Animal species with a lesser level of protection.
 - Schedule III:** Protected plant species.
 - Schedule IV:** Species listed under CITES.
- Establishes Institutional Bodies** like National Board for Wildlife (chaired by the Prime Minister), State Boards for Wildlife, Central Zoo Authority, and Wildlife Crime Control Bureau.
- Prohibits of Hunting** of any wild animal specified in Schedule I, II, III and IV except as provided under Sections 11 and 12.
 - As per Sections 11 and 12, **Chief Wild Life Warden can permit hunting** of wild animals under Schedule I and II in certain cases (dangerous to human life; disabled/diseased beyond recovery; scientific research; scientific management etc.)
- Provides for declaration of areas** as National Parks, Wildlife Sanctuaries, Conservation Reserves, and Community Reserves for the protection of wildlife and their habitats.
- Prior permission for translocation** is required from **Central Government for Schedule I animals** and from **State Government for any other wild animal**.
 - MoEFCC retains **right to revoke the permit** if there are safety issues or mishaps.

1.1.4. BIOLOGICAL DIVERSITY (ACCESS AND BENEFIT SHARING) REGULATION 2025

Why in the news?

The National Biodiversity Authority (NBA) has issued the new **Biological Diversity (Access and Benefit Sharing) Regulation 2025**.

Biological Diversity (Access and Benefit Sharing) Regulation 2025

- **Aim:** Regulate how benefits from use of biological resources (BRs) and associated knowledge are fairly shared.
- **Notified by:** National Biodiversity Authority (NBA) to replace 2014 Guidelines, in accordance with Biodiversity Act (BDA) 2002.
- **Key Highlights:**
 - **Inclusion of Digital Sequence Information (DSI) or associated knowledge** as a mode of benefit sharing for accessing BR.
 - > DSI is a policy term for digital representations of genetic resources, including genomic data like DNA, RNA, and protein sequences.
 - **Prior intimation to NBA for approval** needed for Person/industry intending to access BRs [**Prior Informed Consent (PIC)**]
 - > Not applicable in case of **access to cultivated medicinal plants** notified under BDA 2002.
 - **Slabs delineated based on annual turnover** with amount payable as percentage of annual gross ex-factory sale price of product (excluding Govt. taxes) ranging from nil (Up to 5 Crore turnover) to 0.6% (for turnover above 250 Crore).
 - > Users with more than ₹1 crore turnover must submit annual resource usage statements.
 - **Benefit Sharing for High-Value Biological Resources** (E.g. red sanders, agarwood, etc.) to **not be less than 5%** of proceeds of auction/sale amount/purchase price.
 - > **20% more** than the amount delineated in case of **commercial use**.
 - **Benefits of Research Transfer (Non-IPR Use)** to be **shared with NBA** as mutually agreed.
 - For **IPR Commercialisation**, up to 1% of annual sales revenue (excluding taxes) to be shared with NBA.

About Access and Benefit Sharing (ABS)

- It is about how genetic resources are accessed and how the benefits from their use are fairly shared between users and providers.
- **Framework:** Covered under the **Convention on Biological Diversity (CBD)**.
- **Bonn Guidelines (2002):** Voluntary guidelines to assist governments and stakeholders in developing national, administrative, or policy measures for ABS.
 - Outlined key steps for Prior Informed Consent (PIC) and Mutually Agreed Terms (MAT).
- **Nagoya Protocol (2010):** Legally-binding supplementary agreement to the CBD for fair and equitable sharing of benefits arising from the utilization of genetic resources.
- **Multilateral Mechanism** for the use of **DSI** adopted at **CBD COP16 (2024)**.

Convention on
Biological Diversity

Convention on Biological Diversity (CBD)



Genesis: Intergovernmental treaty adopted at the **United Nations Conference on Environment and Development (Rio Earth Summit) in 1992**.



Members: 196 (**India is a Member**).

- ▷ Every party member is required to have a national biodiversity strategy and action plan.
- ▷ India enacted the **Biological Diversity Act, 2002**.



Three Main Goals: Biodiversity Conservation, Sustainable use of biological resources and Fair and Equitable Benefit-Sharing.



Major Protocols: Cartagena Protocol on Biosafety (2003) and Nagoya Protocol on Access and Benefit-Sharing (ABS) (2014).

India's Legal Framework on Access and Benefit Sharing (ABS)

- **Biological Diversity (BD) Act, 2002** enacted in line with India's commitment to **CBD** to conserve biological diversity, and ensure sustainable use of its components.
- **Scope:** Covers all biological resources within India (broader than scope of **Nagoya Protocol** limited to genetic resources).
- **Implementation:** Three-tier system of statutory bodies
 - National Biodiversity Authority (NBA) at the central level (has the power of a civil court),
 - State Biodiversity Boards (SBBs) at the state level, and
 - Biodiversity Management Committees (BMCs) at the local level.
- **Important ABS-related case study:** Benefit sharing with the **Kani tribal community of Kerala** on developing the **Jeevani drug** from the **Arogyapacha plant** (*Trichopus zeylanicus*), traditionally used by the tribe for its revitalizing properties.

1.1.5. CSS-INTEGRATED DEVELOPMENT OF WILDLIFE HABITATS SCHEME (CSS-IDWH)

Why in the news?

Gharial and Sloth Bear were recommended for inclusion under the Species Recovery Programme of Centrally Sponsored Scheme- Integrated Development of Wildlife (CSS-IDWH).

About CSS-IDWH Scheme

- **Nodal Ministry:** Ministry of Environment, Forest and Climate Change
- **Type:** Centrally Sponsored Scheme
- **Purpose:** Conducting wildlife protection and conservation activities.
- **Financial Assistance:** Provided to State/UT Governments for -
 - **Supporting Protected Areas** (National Parks, Wildlife Sanctuaries, Conservation Reserves and Community Reserves)
 - Protection of **wildlife outside protected areas**
 - **Recovery programmes** for saving critically endangered species and habitats
 - > So far, **22 species** including Snow Leopard, Asiatic Lion, Great Indian Bustard, Gangetic River Dolphin, etc. are included under it.
- **Key Components:** Development of Wildlife Habitats; Project Tiger; Project Elephant.

Sloth Bear	
Characteristics	
 Habitat	▶ Name comes from long claws and unusual teeth , resembling a sloth. ▶ Specializes in eating termites and ants . ▶ Does not hibernate unlike other bear species. ▶ Solitary , mostly nocturnal, agile and known as one of the most aggressive animals Indian subcontinent.
Threats	▶ Habitat loss and degradation, human-animal conflict, Global population fewer than 20,000 .
Conservation Efforts	▶ Project Sloth Bear, 2025; Daroji Sloth Bear Sanctuary (Karnataka) -1st dedicated sloth bear sanctuary in Asia.
WPA, 1972 Schedule I	 CITES Appendix I
 IUCN STATUS VU	

1.1.6. PROJECT CHEETAH

Why on the news?

India-Botswana formally announced translocation of 8 cheetahs to India as a part of 'Project Cheetah'.

About Project Cheetah

- Launched in **2022** aimed at reintroducing cheetahs to India after their extinction in late **1940s/early 1950s**.
- Operates under** the umbrella of **Project Tiger** (renamed as **Project Tiger and Elephant** from **2023-24**).
- Kuno National Park **supports a population of 30 cheetahs (December 2025)**
- Implementing agency:** National Tiger Conservation Authority (NTCA)
- Technical Assistance:** Provided by Wildlife Institute of India (WII)
- Cheetah Project Steering Committee:** Established by **NTCA** in 2023 to oversee, evaluate, and advise on implementation of Project Cheetah.
- Prime Objectives:**
 - To establish breeding cheetah populations in safe habitats across its historical range.
 - To use cheetah as a **charismatic flagship** and umbrella species to garner resources for restoring open forest and savanna systems.
 - To use the ensuing opportunity for **eco-development and ecotourism** to enhance local community livelihoods.

Cheetah



Asiatic Cheetah **African Cheetah**

<p>WPA, 1972 Schedule I</p>   	<p>IUCN STATUS VU</p>  
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Characteristics

- World's **fastest Mammal** and the only large carnivore to be extinct in India (1952).
- Unlike **other big cats (lions, tigers, leopards, and jaguars)** cheetahs don't roar.

Habitat

- Asiatic Cheetah:** Found only in arid regions of **eastern Iran, officially declared extinct in India in 1952**.
- African Cheetah:** Found in grasslands, scrublands, and open forests across the continent, especially in Botswana, Namibia and South Africa.
- Namibia holds the largest population.

About Gandhi Sagar Wildlife Sanctuary

- Location:** Eastern Madhya Pradesh, Region is known as Nimar region.
- Forest Type:** Part of Khathiar-Gir dry deciduous forest.
- River:** River Chambal
- Dam:** Surrounding to Gandhi Sagar dam backwater.

- **Trees:** Salai, Kardhai, Dhawda, Tendu, Palash etc.
- **Wildlife:** Wild Dogs (Dholes), Chinkara, Leopard, Otter, Mugger crocodile.
- **Historical:** Part of world famous Chaturbhuj Nala rock shelters.

1.1.7. TIGER RESERVES

Why in the News?

Supreme Court issued directions for protection of tiger reserves to address increasing Human-Wildlife Conflicts due to habitat degradation, unregulated tourism, and corridor fragmentation.

Directions issued by the Supreme Court

- No Tiger safaris in core areas or designated tiger corridors.
 - Permitted only on non-forest or degraded forest land in buffer zones
- Night Tourism to be banned in core/critical tiger habitats.
- Prohibited Activities: Commercial mining, polluting industries, major hydro projects, exotic species introduction, low-flying aircraft or commercial firewood extraction barred in buffer/fringe areas.
- All reserves must notify Eco-Sensitive Zones (ESZs) as per the 2018 Ministry of Environment's guidelines under the Environment Protection Act, 1986.
- States must prepare/revise Tiger Conservation Plans (TCPs) within stipulated timelines.
- Core and buffer areas to be notified within 6 months.
- Natural Disaster status for Human-Wildlife Conflicts (HWCs) to ensure rapid relief.
 - Uniform ex-gratia of ₹10 lakh for human deaths due to HWCs.
- Draft HWC mitigation guidelines to be drafted by the National Tiger Conservation Authority (NTCA) within six months, and to be implemented by all States.

About Tiger Reserves

- Legally protected areas under Project Tiger (1973) for long-term conservation of tigers, comprising-
 - Core Areas (critical habitat): Inviolable; no tourism or commercial activity.
 - Buffer Areas (sustainable use zone): Regulated eco-development; limited tourism.
- Declared by NTCA (a statutory body under the WPA, 1972 approves and notifies reserves; States propose sites.
- Total Reserves: 58 (most recent- Madhav Tiger Reserve and Ratapani Wildlife Sanctuary in Madhya Pradesh)
- Notified by State Governments as per provisions of the WPA, 1972 on advice of NTCA.
- No alteration in boundaries can be made except on a recommendation of NTCA and the approval of the National Board for Wild Life.

1.1.8. INTERNATIONAL BIG CAT ALLIANCE (IBCA)

Why in the News?

India and IBCA signed the Headquarters Agreement to host the IBCA Headquarters and Secretariat in India, helping IBCA efficiently discharge its official functions.



International Big Cat Alliance (IBCA)



Genesis: Launched by India in 2023 to commemorate 50 years of Project Tiger



Entity Type: Treaty based inter-governmental international organization and legal entity.



Aim: Conservation of **7 big cats** namely Tiger, Lion, Leopard (Vulnerable), Snow Leopard, Cheetah, Jaguar (Near threatened) and Puma (Least Concern).

▷ All except **Puma and Jaguar** are found in India and protected under Schedule I of Wildlife Protection Act, 1972.



Membership: Multi-country, multi-agency coalition of **95 big cat range** countries, **non-range** countries with an interest in **big cat conservation**.

▷ **Founding Members (16):** Armenia, Bangladesh, Bhutan, Cambodia, Egypt, Ethiopia, Ecuador, **India**, Kenya, Malaysia, Mongolia, Nepal, Nigeria, Peru, Suriname, & Uganda.



Budgetary support from India: ₹ 150 crore for 5 years from 2023-24 to 2028-29.



IBCA Assembly: Serves as apex decision-making body, convened at least **once every 2 years**.

▷ **New Delhi** hosted **1st assembly of IBCA in 2025** endorsed by India's Union Minister of Environment, Forest & Climate Change, as **President of IBCA**.

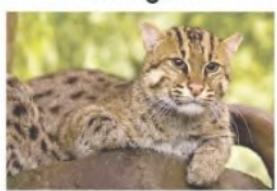
1.1.9. STATUS OF SMALL CATS IN TIGER LANDSCAPE OF INDIA REPORT

Why in the News?

Report by **Wildlife Institute of India (WII)** and **National Tiger Conservation Authority (NTCA)** provides comprehensive assessment of **small cats'** occupancy status and dynamics.

About Small Cats

- Diverse group of **hyper carnivores** within subfamily **Felinae**, found across terrestrial biomes.
- **10 small cat species found in India:** Pallas's cat, Eurasian lynx, jungle cat, fishing cat, leopard cat, rusty-spotted cat, marbled cat, Asiatic golden cat, desert cat, and caracal.
 - **Jungle Cat** is most widespread small cat species, followed by **Rusty-Spotted Cat (World's smallest wildcat)**.
- **Difference with Big Cats: Big cats (Like tigers, lions etc.)** possess a flexible **hyoid bone** enabling them to **roar**, small cats have a **rigid hyoid bone**, which allows them to **purr continuously**.

Major Small Cats in India	
Species and Protection Status	Details
Asiatic golden cat  IUCN STATUS NT WPA, 1972 Schedule I 	<ul style="list-style-type: none"> Habitat: Endemic to Indo-Malayan eco-realm i.e. Assam, Sikkim, Meghalaya, Mizoram, Nagaland, Arunachal Pradesh, and West Bengal. Characteristics: Territorial and solitary, (With occasional pairing).
Caracal  IUCN STATUS LC WPA, 1972 Schedule I 	<ul style="list-style-type: none"> Habitat: Arid and semi-arid regions, Reported in only 3 states in India (Rajasthan, Gujarat, and Madhya Pradesh). Characteristics: Also called Siya Gosh (black-tufted ears); Solitary and territorial animal, nocturnal.
Covered under Species Recovery Programme	
Fishing cat  IUCN STATUS VU WPA, 1972 Schedule I 	<ul style="list-style-type: none"> Habitat: Wetland environments; Sundarbans, Himalayan foothills, and parts of Northeast India. Characteristics: Nocturnal, webbed hind feet to propel itself in shallow water.
Eurasian lynx  IUCN STATUS LC WPA, 1972 Schedule I 	<ul style="list-style-type: none"> Habitat: Barren, relatively open, rocky mountainous plateau of Central Asia; some parts of Ladakh in India. Characteristics: Primarily solitary, territorial, and nocturnal animals.

1.1.10. STATUS OF ELEPHANTS IN INDIA

Why in the News?

Synchronous All India Population Estimation of Elephants (SAIEE) 2021-25 is India's first DNA-based count of elephants conducted by the **Wildlife Institute of India (WII)**, under the aegis of **Project Elephant**.

Key Findings of the report

- India harbours ~60% of global total **Asian Elephant wild population- largest globally** (>22,000)
- Found mainly in 4 forested hill regions**— Himalayan foothills, Northeastern states, East-central India, and Western/Eastern Ghats, with a small feral population in Andaman Islands.
 - Western Ghats hosts the largest population of wild elephants** followed by North Eastern Hills and Brahmaputra Flood Plains.
- Karnataka supports highest population**, followed by Assam, Tamil Nadu and Kerala.
- Threats:** Changing land use, Habitat Shrinkage & Fragmentation, Human-Elephant Conflict (HEC), Linear Infrastructure and fatalities via electrocution and collisions.

Asian Elephants (*Elephas maximus*)



Characteristics

- **Largest land mammal on Asian continent.**
- **3 Sub-species:** Indian, Sumatran and Sri Lankan
- **Highly intelligent animals** with strong family bonds and sophisticated forms of communication.
- **Complex social structures** led by a matriarch (a female leads the group).
- **Life span:** 60–70 years.
- **Longest gestation period in mammals:** 22 months.



Habitat

- Dry to wet forest and scrubland/grassland habitats in 13 range countries.
- **Role of Elephants in Ecosystem:** Create pathways for other animals in dense forest, creation of micro ecosystems, and seed dispersal maintaining forest diversity.



Conservation Measures

- **Project Elephant:** Launched in 1992.
- **33 Elephant Reserves** in 14 major Elephant states.



WPA, 1972
Schedule I



Difference between Asian and African Elephants

Parameters	Asian Elephants	African Elephants
Size	Smaller	Larger
Head shape	Twin-domed with a central indent	Rounded/Flat single dome
Ears	Small, rounded	Savannah Elephants: Large, fan-shaped Forest Elephants: Perfectly oval/round
Tusks	Only some males have visible tusks, female may have smaller tusks.	Both male and female have larger tusks. Savannah elephants: Curved, thick, outward-pointing Forest elephants: Straight, thin, downward-pointing
Back	Humped/convex, curved outward	Concave/ dipped

1.1.11. 50 YEARS OF CROCODILE CONSERVATION PROJECT

Why in the News?

On the eve of World Crocodile Day (June 17) India celebrated 50 years of its Crocodile Conservation Project.

About Crocodile Conservation Project

- **Project Launch: April, 1975** based on **H.R. Bustard's** recommendations.
- **Objective:** Protect Crocodile's natural **habitats** and rebuild the population quickly through **captive breeding**.

Crocodile Conservation Success in India

- **Odisha:** Only state with conservation centres for all 3 native crocodilian species:

- Tikarpada (Satkosia) for gharials; Dangamal (Bhitarkanika) for saltwater crocodiles; Ramatirtha (Simlipal) for mugger crocodiles.
- **Saltwater Crocodile & Mugger Recovery:**
 - **Saltwater crocodile population:** Recovered to ~2,500 individuals
 - **Mugger crocodile population:** Rebounded to 8,000–10,000 individuals, reclaiming most of its historical range (i.e., Ganga River drainage).
- **Gharial Conservation:** National Chambal Sanctuary (spanning Madhya Pradesh, Rajasthan, Uttar Pradesh), Katarnia Ghat Wildlife Sanctuary (Uttar Pradesh), Gandak River, Corbett Tiger Reserve (Uttarakhand), and Son Gharial Sanctuary (Madhya Pradesh).
 - India now holds 80% of the global wild gharial population.

Ongoing Conservation Efforts:

- **Gharial Conservation Project (2025)**, aimed to expand gharial populations across the **Ganges**, **Brahmaputra**, and **Indus** rivers, as well as **Mahanadi** in Odisha.
- **Madras Crocodile Bank:** Breeding crocodiles and supporting reintroduction programmes.

Crocodiles Found in India			
<p>Saltwater Crocodile (Estuarine Crocodile) (<i>Crocodylus porosus</i>)</p>  <div style="display: flex; justify-content: space-around; align-items: center;"> IUCN STATUS LC CITES Appendix I WPA, 1972 Schedule I </div>	<p>Characteristics</p> <ul style="list-style-type: none"> ▶ Nocturnal animals. ▶ Poikilothermic (regulate their body temperature only to a limited degree). ▶ Diversity: 13 different crocodile species, 3 native species found in India- <ul style="list-style-type: none"> ▶ Saltwater crocodile. <ul style="list-style-type: none"> ➢ Largest crocodile and Earth's largest living vertebrate-class reptile. ➢ Strongest bite force of any living animal. ▶ Muggers <ul style="list-style-type: none"> ➢ Known to use 'tools' e.g. balance stick on their head to lure birds for nesting material. ➢ Only Indian species that digs burrows on land to escape extreme temperatures. ▶ Gharial <ul style="list-style-type: none"> ➢ Adult males have a bulb-like structure on snout tip called GHARA (acts as a resonator to produce loud buzzing noises and blow bubbles to attract females). ➢ Expert fish catchers. ➢ Thinnest and most elongated snout among crocodilians. ➢ Only visibly sexually dimorphic crocodilian. 	<p>Marsh Crocodile (Muggar, Broad-snouted Crocodile) (<i>Crocodylus palustris</i>)</p>  <div style="display: flex; justify-content: space-around; align-items: center;"> IUCN STATUS VU CITES Appendix I WPA, 1972 Schedule I </div>	<p>Habitat</p> <ul style="list-style-type: none"> ▶ Saltwater crocodile: Brackish water, mangrove swamps, estuaries, and coastal waters. <ul style="list-style-type: none"> ➢ Bhitarkanika in Odisha (largest share), Andaman & Nicobar Islands and Sundarbans (West Bengal). ▶ Muggers: Freshwater habitats like lakes, rivers, and slow-moving streams. ▶ Gharial: Deep, clear, fast-flowing freshwater rivers with high sandbanks for nesting. <ul style="list-style-type: none"> ➢ Nepal: Rapti–Narayani River. ➢ India (Ganges tributaries): Girwa (UP), Son (MP), Ramganga (Uttarakhand), Gandak (Bihar), Chambal (UP, MP, Rajasthan), Mahanadi (Odisha).
<p>Gharial (Fish Eating Crocodile, Indian Gavial, Gavial, Long Nosed Crocodile) (<i>Gavialis gangeticus</i>)</p>  <div style="display: flex; justify-content: space-around; align-items: center;"> IUCN STATUS CR CITES Appendix I WPA, 1972 Schedule I </div>			

1.1.12. RIVER DOLPHINS

Why in the News?

Ministry of Environment, Forest and Climate Change and Wildlife Institute of India (WII) released '**Population Status of River Dolphins in India 2024**', India's First Comprehensive Riverine Dolphin Population Estimate.

Key Findings

- **India's River dolphin population:** 6327- **Gangetic River dolphins** (6324), **Indus River Dolphins** (only 3).
- **Distribution:** Mainly in Ganga, Brahmaputra and Indus River basins.
- **Uttar Pradesh has highest** dolphin population followed by Bihar, West Bengal.
- **Umbrella species:** Dolphin conservation has direct impacts on their habitat and biodiversity.

River Dolphins in India

Gangetic Dolphin (Platanista gangetica gangetica)



WPA, 1972
Schedule I



Appendix I



HIGH STATUS
EN

Characteristics:

- Ganges and Indus River Dolphins are **two distinct species** based on genetic and morphological data.
- **Functionally blind**, and rely on **echolocation** to navigate and hunt.
- **A long thin snout**, rounded belly, stocky body and large flippers.
- As an **apex predator**, key Indicator species of the health of rivers.
- **Unique side swimming behaviour**: Adaptation to help them navigate through shallow waters.
- **Gangetic Dolphin:**
 - **National Aquatic Animal of India**
 - **Local Name**: 'Susu' based on sound made by them while breathing.
 - Called the "**tiger of the ganges**" (apex predator).
 - Females are larger than males.
- **Indus River Dolphin:**
 - **Punjab's State Aquatic Animal**
 - **Local name**: 'Bhulan'
 - **Brown/grey** in colour
 - Adapted to live in the **muddy river**

Indus River Dolphin (Platanista minor)



WPA, 1972
Schedule I



Appendix I



HIGH STATUS
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Habitat:

- **Gangetic Dolphin:** Ganges-Brahmaputra-Meghna, and Sangu-Karnaphuli River systems in Bangladesh, India and Nepal.
 - Commonly found in **deeper** sections of river, **confluences (freshwater)** etc.
 - **India** is home to **90%** of the world's Ganges River dolphins.
- **Indus River Dolphin:** Indus River system in India and Pakistan; found in Beas River in India.

Threat:

- Unsustainable fishing, Man-made water infrastructure, poor water quality, human disturbance, climate change (increasing salinity)

Conservation Measures:

- **Project Dolphin** (2020)
- **Vikramshila** Gangetic Dolphin Wildlife Sanctuary, Bihar
- **Chambal River Conservation Zone** designated as Dolphin Conservation Zone
- **India's first National Dolphin Research Centre (NDRC)** at Patna, Bihar
- **Conservation Assured | River Dolphin Standards (CA|RDS, 2021)**: Species-focused tool to improve river dolphin conservation efforts.

1.1.13. VULTURES

Why in the news?

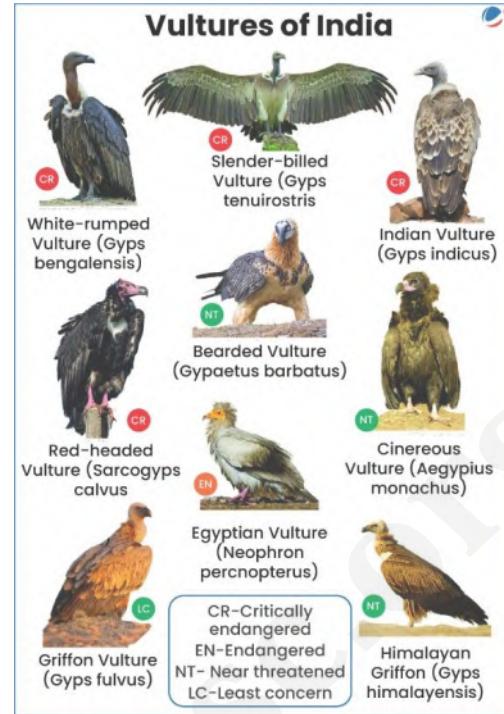
Wildlife Institute of India (WII) releases its 1st Pan-India Assessment and Monitoring of Endangered Species (Vultures).

Major Findings

- Dependence on Protected Areas (PAs):** PAs hold **54% of all documented nests**
- Focus: Four Critically Endangered species** i.e., the White-rumped, Indian, Slender-billed, and Red-headed vultures at 216 sites across 17 states.
- Indian Vulture (Gyps indicus):** Found mainly in Madhya Pradesh & Rajasthan (largest at Mukundra Hills); reliant on secure cliff sites
- White-rumped Vulture (Gyps bengalensis):** Concentrated in Kangra Valley, Himachal Pradesh
- Slender-billed Vulture (Gyps tenuirostris):** Breeding mostly in Upper Assam
- Red-headed Vulture (Sarcogyps calvus):** Found in Madhya Pradesh; depends on dense, undisturbed forests; population extremely low and fragmented.

About Vultures

- Characteristics:** Scavenge on animal carcasses
- Threats:** Ingestion of **toxic non-steroidal anti-inflammatory drugs (NSAIDs)** like diclofenac (used to treat livestock), habitat loss, electrocution, etc.
- Conservation Initiatives:** All vultures covered in **Species Recovery Programme** and listed under **Schedule I of WPA**; Vulture Conservation Breeding Centre (VCBC)- at Rani (Assam), Pinjore (Haryana); Action Plan for Vulture Conservation in India, 2020-2025; Assam-based foundation launched India's first vulture conservation portal; 'Vulture Restaurant' in Koderma district, Jharkhand etc.



1.1.14. DRAFT POLICY PAPER ON CAMELS

Why in the News?

Draft policy paper on Camels, prepared by Ministry of Fisheries, Animal Husbandry and Dairying and Food and Agriculture Organization (FAO) has proposed **National Camel Sustainability Initiative (NCSI)**.

Key Highlights of Draft Policy Paper

- India's camel population **declined by more than 75%** since the 1970s.
- Drivers of Population Decline:** Decline in traditional economic utility, loss of grazing lands, environmental stress (desertification, invasive species, etc.), underdeveloped markets etc.

About Camels

- Habitat:** Dryland ecosystems (referred as "Ship of the Desert") and are **primarily reared (90%) in Rajasthan and Gujarat.**
 - Camel-rearing Pastoralist communities:** Raika, Rabari, Fakirani Jat, and Manganiyar.
- Characteristics:** Survive days without drinking water, travel long distances, feed on thorny desert plant.
 - Camels' humps store fats** providing them energy when food is scarce and they **store water in their blood cells**, not their humps.
- Role of Camels:** Their low water needs, selective grazing habits, and soft-padded hooves help maintain vegetative diversity and prevent desertification; Camel dung **enriches soil in arid regions**.

Key Camel Breeds in India

Single-humped Dromedary Camels

- **Bikaneri (Rajasthan):** Used for cart pulling and heavy draught work due to strength and endurance.
- **Jaisalmeri (Rajasthan):** Known for stamina and speed, this tall and slender breed is used for camel safaris, especially in Thar Desert.
- **Mewari (Rajasthan):** Known for its milk yield.
- **Kachchhi (Gujarat):** Strong draught breed used for ploughing and carting in Rann of Kachchh.
- **Kharai (Gujarat, primarily in Kutch):** Capable of swimming up to 3 kms in seawater; Adapted to coastal and mangrove ecosystems- survives by grazing on mangroves; can be domesticated; milk is rich in nutrients and has potential therapeutic benefits; Preserved by Rabari and Fakirani Jat tribes.

Double Humped Bactrian Camel

- **Habitat of Domestic Bactrian camels:** Eastern Europe to East Asia, particularly Iran, Afghanistan, Pakistan, Kazakhstan, Mongolia and China.
 - In India, found exclusively in high altitude cold desert of Ladakh.
- **Characteristics:**
 - **Adaptations:** Two Humps as Energy reservoir (fat, not water); Thick Coat (Thermal shield); Broad Feet (Sand-walk adaptation); Long Eyelashes & Sealable Nostrils (Dust defense); utilise thorny, dry and sparse plants like seabuckthorn shrub; Can eat snow to partially meet water needs. Indicator of arid biomes, flagship species for Central Asian steppe conservation
 - Key to Silk Road trade and cultural exchange.
 - Capable of carrying loads up to 250 kg.
 - **Note:** Wild Bactrian Camel (Camelus ferus- a distinct species) is Critically Endangered (IUCN) found in four isolated desert-Gobi habitats.

1.1.15. WILD YAK

Why in the News?

First-ever chromosome-level genome of the Indian/Domestic Yak (**Bos grunniens**), a descendant of Wild Yak (**Bos mutus**) was assembled by specialists from four ICAR institutions.

About Wild Yak (**Bos Mutus**)

- **Habitat:** Alpine tundra, grasslands, and cold desert regions of the northern Tibetan plateau with mountainous areas ranging from 4,000 to 6,100 m elevation.
- **Regional Occurrence:** Native to China, India and are regionally extinct from Bhutan.
- **Key Characteristics:** Move seasonally descending into lower valleys in the winter.
 - Feeds mostly on grasses and sedges, with some forbs.
 - Yaks are gregarious, often aggregating into groups of >100 individuals, although smaller groups of 10-20 are also common.
- **Major Threats:** Poaching, including commercial poaching for meat, Interbreeding between domestic and Wild Yaks, etc.

Wild Yak (**Bos mutus**)



WPA, 1972
Schedule I



CMS
Appendix I

IUCN STATUS
VU

About Indian/Domestic Yak (**Bos grunniens**)

- Known as the 'ship of the Himalayas', supports high-altitude communities with meat, milk, and transport.
- **Habitat:** Found across Himalayan region, Tibetan Plateau, Pamir Mountains, Tajikistan, and up to Mongolia and Siberia.
- **Characteristics:** Have larger lungs and heart than cattle; Herbivorous.

1.1.16. TAMIL NADU'S ENDANGERED SPECIES' CONSERVATION

Why in the news?

Tamil Nadu sanctions Rs 1 crore for conservation of four endangered species- the lion-tailed macaque, Madras hedgehog, striped hyaena, and hump-headed mahseer fish.

Details of Species

	Lion-tailed macaque	Madras or Bare-Bellied Hedgehog	Striped Hyaena	Hump-headed mahseer fish
IUCN Status				
CITES Listing	Appendix I	Not listed	Appendix III	Not listed
WPA Status	Schedule I	Schedule II	Schedule I	Not explicitly listed
Endemic Region	Western Ghats (Tamil Nadu, Kerala, Karnataka)	India	Afghanistan; Algeria; Pakistan, India etc	India (Tamil Nadu, Kerala, Karnataka)
Threats	Extensive agriculture, Urbanization and Mining	Illegal pet trade, Logging & wood harvesting etc.	Persecution (especially poisoning), decreasing sources of carrion	Dams, destructive fishing, invasive species etc.
Other Key information	Survives in fragmented rainforest patches.	Known locally as the 'thorny rat', Nocturnal species found in semi-arid regions	Natural scavenger that regulates diseases, witnessing a sharp decline across Mudumalai Tiger Reserve.	Called Tiger of Kaveri for the fight it puts up.

1.2. FORESTS

1.2.1. VAN (SANRAKSHAN EVAM SAMVARDHAN) AMENDMENT RULES, 2025

Why in the News?

MoEFCC notified the **Van (Sanrakshan Evam Samvardhan) Amendment Rules, 2025** marking significant changes in the Van (Sanrakshan Evam Samvardhan) Rules, 2023.

Major highlights of the Van (Sanrakshan Evam Samvardhan) Amendment Rules, 2025

- Notified by Central Government under the **Van (Sanrakshan Evam Samvardhan) Adhiniyam, 1980** (Forest Conservation Act 1980), amended by **Forest (Conservation) Amendment Act, 2023**.
- Compensatory Afforestation (CA)** land allowed to be either transferred to Forest Department or notified as protected area under Indian Forest Act, 1927 or other laws.
 - Compensatory Afforestation means **afforestation done in lieu of the diversion of forest land** for non-forestry use under the Forest (Conservation) Act, 1980.
- Mining of critical/strategic minerals** (under MMDR Act, 1957) must undertake CA on **degraded forest land, minimum double the extent**.
- State governments allowed to grant initial 'working permission' for linear projects** activities such as roadworks (other than blacktopping and concretization), railway tracks, and transmission lines.

- Previously, state governments could mobilize resources **only after receiving in-principle or Stage-I approval for a project.**

Procedure for Forest Clearance (as per Forest (Conservation) Act, 1980):

- **Stage I – In-Principle Approval:** Approval is granted if certain conditions are met like allocating funds for compensatory afforestation.
- **Stage II – Final Clearance:** Given after the State confirms compliance with all Stage I conditions.
- **Approval Authority:**
 - **For projects up to 5 hectares** (except mining), clearance is given by the Chief Conservator of Forests at the Regional Office.
 - **For projects above 5 hectares**, or any mining proposals, clearance is granted by the Ministry of Environment, Forests and Climate Change based on the advice of the Forest Advisory Committee.

About Forest (Conservation) Amendment Act, 2023

- **Definition of forest:**
 - **Land declared or notified as a forest** under any law (e.g., Indian Forest Act, 1927).
 - Land recorded as forest in **Government records** (Revenue or Forest Dept.) on or after 25th October 1980.
 - > This does not include land which has been officially changed from **forest use to use for non-forest purposes on or before 1996.**
 - In 2024, the Supreme Court directed States/UTs to follow the **1996 T.N. Godavarman case** definition of "forest" until the identification of forest land under the 2023 Forest (Conservation) Act amendment is completed.
- **Activities excluded from definition of non-forest purposes-** establishment of **zoos and safaris** under the WPA, 1972, in forest areas, other than **protected areas; eco-tourism facilities** included in plans of the area; **silvicultural operations** including regeneration operations; and any other purposes specified by Central Government.
- **Categories of land exempted from provisions of Act-.**

Exempted Projects	Extent of exemption
Connectivity to a habitation, or to a rail, and roadside amenity	Forest land up to 0.10 hectares along a rail line or public road maintained by Government
Projects of national importance & concerning national security.	Forest land within 100 kms of international borders or Line of Control or Line of Actual Control.
Construction of security-related infrastructure	Forest land up to 10 hectares
Defence projects, paramilitary camps or public utility projects	Forest land up to 5 hectares for in a Left-Wing Extremism-affected area

Related Judgment: T N Godavarman Thirumalpad v. Union of India case (1996)

- Landmark Supreme Court decision that established a **broad and comprehensive definition of "forest".**
- **Definition of "forest" expanded to include:**
 - All areas recorded as "**forest**" in **any government (Union and State) record**, irrespective of ownership, recognition, and classification.
 - All areas that conformed to the "**dictionary**" meaning of forest.
 - Areas that are **identified as "forest"** by expert committees set up by the States following the 1996 order.

1.2.2. NATIONAL MISSION FOR A GREEN INDIA**Why in the news?**

Ministry of Environment, Forest and Climate Change (MoEFCC) unveiled revised mission document of the National Mission for a Green India or Green India Mission (GIM).

About Green India Mission

- **Genesis:** Launched in **2014** among **8 missions** under **National Action Plan on Climate Change (NAPCC)**.
- **Objectives:**
 - Increase forest and tree cover on forest/non-forest lands (Afforestation over 24 million hectares)
 - Improve ecosystem services including carbon sequestration
 - Creation of an additional **carbon sink of 2.5 to 3.0 billion tonnes of CO₂** equivalent by 2030, etc.
- **Three Sub-Missions**
 - Improve forest quality and ecosystem services
 - Increase forest/tree cover and restore ecosystems
 - Enhance and diversify incomes of forest-dependent communities.
- **Funding:** Part of the funding will come from Mission's allocation and the rest from the **National CAMPA (Compensatory Afforestation Fund Management and Planning Authority) Fund**.
- **Timeline:** 10 years (2021-2030)
- **Implementation:** Bottom-up model with **Joint Forest Management Committees (JFMCs)** as key implementers.

Key Mission Strategies (linked to India's NDC Commitments)



Micro-Ecosystem Approach:

Focus on vulnerable zones like Aravallis, Western Ghats, NW arid regions, mangroves, and IHR.



Private Sector:

Leverage CSR for restoration and village support.



Carbon Markets:

Sell carbon credits from forestry/agroforestry via voluntary markets.



Green India Force:

Trained youth cadre for implementation and maintenance.

1.2.3. ENVIRONMENTAL ACCOUNTING ON FOREST 2025

Why in the news?

Environmental Accounting on Forest 2025 Report was released by the **Ministry of Statistics and Programme Implementation (MoSPI)**.

About Environmental Accounting on Forest 2025

- 8th consecutive issue related to environment accounts.
- First dedicated publication on forest accounting, based upon the **UN System of Environmental Economic Accounts (SEEA) Framework**.
 - SEEA is an **international statistical standard** that **integrates economic and environmental data** to assess the environment's contribution to the economy and the economy's impact on the environment.
 - Developed by: **UN, European Commission, and Food and Agriculture Organization** in 2012.
 - First adopted by the **MoSPI in 2018**.

Status of Indian Forests as per, India State of Forest Report (ISFR) 2023 (Biennial publication of Forest Survey of India)

- **Total forest and tree cover:** Increased to 25.17% of geographical area compared to 2021 assessment (24.62%).
 - Includes 21.76% **Forest cover** and 3.41% **Tree cover**.
 - **Maximum increase:** Chhattisgarh, Uttar Pradesh, Odisha, and Rajasthan.
- **Forest Cover:** 19 states/UTs have forest cover **above 33% of area**.
 - 8 states/UTs with forest cover **above 75%:** Mizoram, Lakshadweep, A & N Island, Arunachal Pradesh, Nagaland, Meghalaya, Tripura, and Manipur.

- **Top 3 states (Area):** Madhya Pradesh; Arunachal Pradesh; Chhattisgarh.
- **Top 3 States (%):** Lakshadweep (91.33%); Mizoram; Andaman & Nicobar Islands.
- **Total Mangrove cover:** Stood at 4,992 km² (**Decrease** of 7.43 km² compared to **2021**).
 - Gujarat saw a **decrease** whereas **Andhra Pradesh and Maharashtra** saw an **increase**.
- **Target under NDC: Carbon stock** reached **30.43 Bt of CO₂ equivalent**, indicating India has reached **2.29 Bt of additional carbon sink** (compared to 2005) as against target of **2.5 to 3.0 Bt by 2030**.

Key Terms

- **Forest area:** Area recorded as forest in **Government records**, also called “**Recorded Forest Area**”.
- **Forest Cover:** All lands, **more than or equal to 1 hectare in area**, with a tree canopy of **more than or equal to 10%**, irrespective of ownership and legal status; and includes orchards, bamboo, and palm
- **Tree cover:** Comprises all tree patches outside forest area, which are less than 1 hectare including all scattered trees found in rural and urban settings, and not captured under forest cover assessment.
- **Carbon Stock:** Carbon in all **living and non-living biomass** including Above Ground Biomass, Below Ground Biomass, Deadwood, Litter, and Soil carbon
- **Protected Forests:** Area notified under **provisions of Indian Forest Act or other State Forest Acts** with limited degree of protection. Permits all activities unless prohibited.

1.3. WETLANDS, COASTLAND AND OCEANS

1.3.1. UN ‘HIGH SEAS’ TREATY

Why in the News?

Treaty for the Conservation and Sustainable Use of Marine Biological Diversity of Areas Beyond National Jurisdiction (**BBNJ agreement**) also known as **High Seas Treaty** has been ratified by 60 countries and will enter into force.

About BBNJ Agreement, 2023

- A **legally binding** international treaty under **United Nations Convention on the Law of the Sea (UNCLOS)**.
- The BBNJ Agreement will be **third** implementation agreement under **UNCLOS**, others are-
 - **1994 Part XI Implementation** Agreement (exploration and extraction of mineral resources in the international seabed area) and
 - **1995 UN Fish Stocks Agreement** (conservation and management of straddling and highly migratory fish stocks).
- **Aim:** Ensuring the **conservation and sustainable utilisation of marine biological diversity** in areas beyond national jurisdiction, i.e. **area beyond economic exclusive zone**.
- **Implementing Ministry:** Ministry of Earth Sciences
- Mandated to enter into force 120 days after 60 countries ratified it.
 - **India signed treaty but not ratified yet.**
 - Members not part of UNCLOS can also join BBNJ agreement

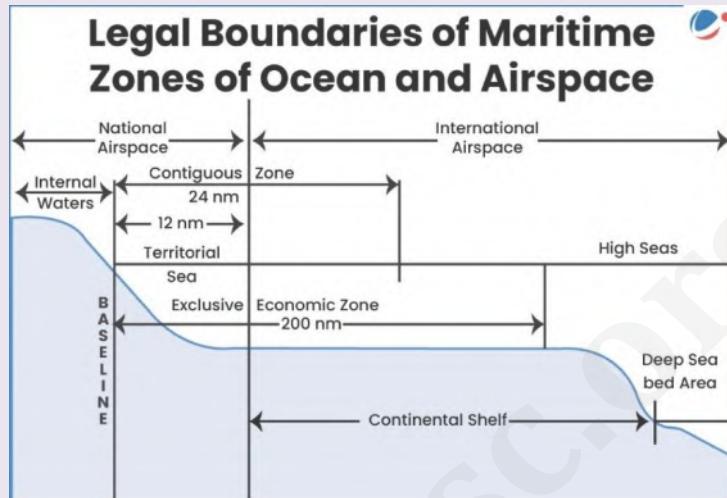
Key Pillars of the Treaty

- **Mechanisms for area-based management tools** such as **Marine Protected Areas (MPAs)** in the high seas.
 - MPAs are clearly defined geographical spaces, recognized, dedicated and managed, through legal or other effective means, to conserve marine biodiversity and ecosystems.
- **Share financial and non-financial benefits** from the commercial application of **Marine Genetic Resources (MGRs)**.
- **Capacity Building and Transfer of Marine Technology** to assist developing countries in implementing the treaty by sharing knowledge, skills, and technology.
- **Environmental Impact Assessments** for High seas activities such as deep-sea mining.
- **Exceptions to agreement**
 - **Warship**, military aircraft or naval auxiliary.

- **Fishing and fishing-related activities** that are regulated under other relevant international law.
- The obligations concerning the utilization of MGRs and their digital sequence information **do not apply to a Party's military activities**, including those by government vessels and aircraft in non-commercial service.

United Nations Convention on the Law of the Sea (UNCLOS)

- Often called the “**Constitution of the Oceans**”, is the primary international treaty governing **use of the seas and oceans**.
 - Adopted in **1982**, it entered into force in **1994**.
- **State Parties:** 171 State parties (including **India**) have ratified it.
- **Maritime Zones**
 - **Territorial Sea:** up to **12 nautical miles (nm)** from baseline → full sovereignty of the coastal state.
 - **Contiguous Zone:** up to **24 nm** → enforcement rights for customs, immigration, sanitation, and security.
 - **Exclusive Economic Zone (EEZ):** up to **200 nm** → sovereign rights for exploration and use of marine resources.
 - **High Seas:** beyond national jurisdiction → freedom of navigation, overflight, fishing, research.
- **Deep Seabed Mining:** Seabed beyond national jurisdiction is the “**common heritage of mankind**”, managed by the **International Seabed Authority (ISA)**.
- **Dispute Settlement:** Establishes mechanisms like the **International Tribunal for the Law of the Sea (ITLOS)**.



1.3.2. RAMSAR CONVENTION ON WETLANDS

Why in the News?

15th Conference of Parties (CoP15) of Ramsar Convention was held in Victoria Falls (Zimbabwe) with the theme ‘Protecting Wetlands for Our Common Future’.



Ramsar Convention on Wetlands



Gland

 **Intergovernmental treaty** for conservation and wise use of wetlands.

▷ Wise use is defined as **maintaining the ecological character** of wetlands using **ecosystem-based approaches** within the context of sustainable development.

 **Genesis:** Adopted in **1971** in Ramsar, Iran and came into force in **1975**.

 **Members:** 172 countries, **India joined in 1982**.

▷ Contracting parties are mandated to promote wise use of wetlands through **national plans, legislation, management actions and public education**.

Mechanisms under Ramsar Convention

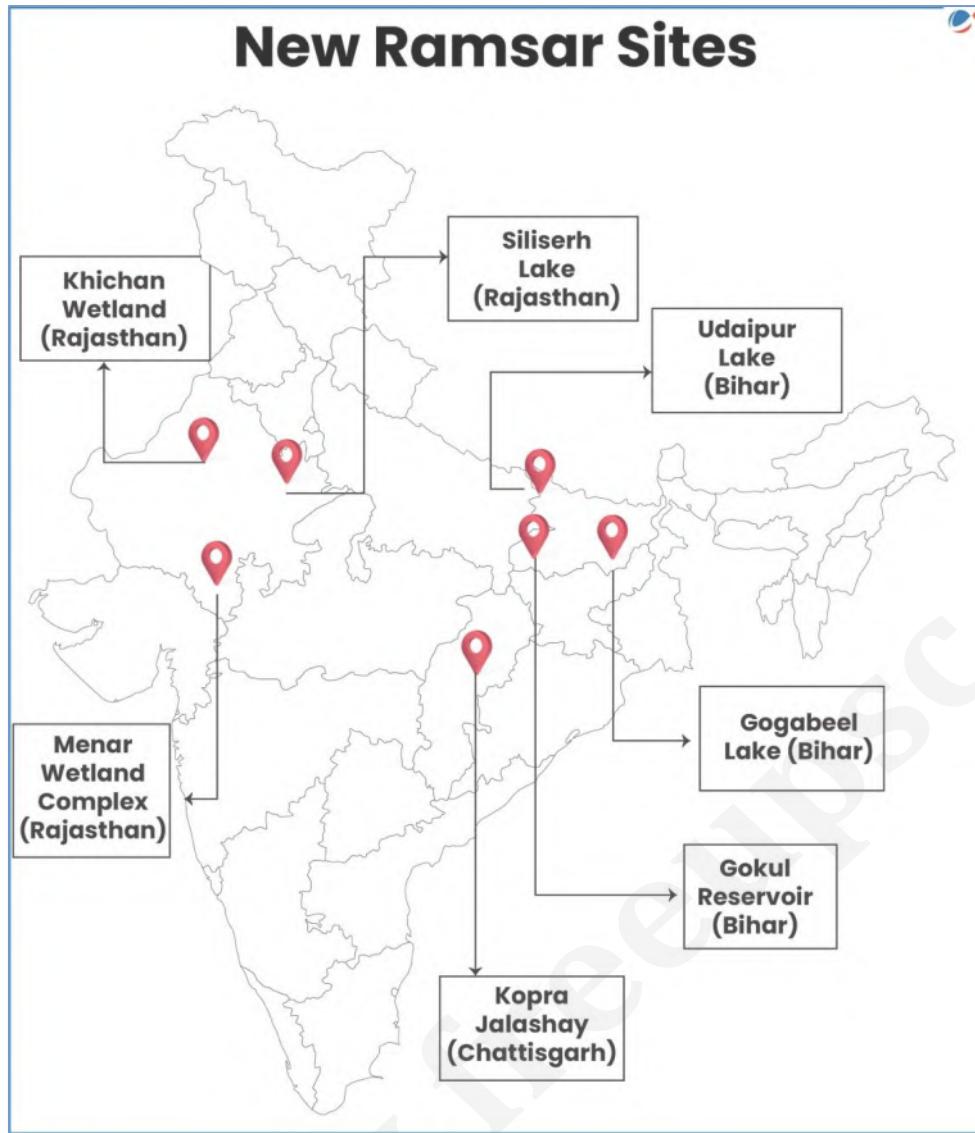
- **Ramsar List** (List of Wetlands of International Importance): **World's largest network** of protected areas, Ramsar sites designated based on **meeting at least one of 9 criteria** (representative, rare, or unique example of a natural or near-natural wetland type; supports vulnerable/endangered/critically endangered species or threatened ecological communities; etc.)
 - Wetlands included in List acquire a **new status at the national level** and are recognized internationally as being of **significant value for humanity**.
 - **Country with most Sites:** United Kingdom
 - **Largest Site:** Rio Negro in Brazil (120,000 square kilometres)
 - **Sites in India:** 96 (**highest in Asia**)
- **Montreux Record:** Lists Ramsar wetlands facing ecological change due to human interference.
 - **Site in India:** Keoladeo National Park (Rajasthan) and Loktak Lake (Manipur)
 - **Chilika Lake, Odisha was removed** after successful conservation efforts
- **Wetland City Accreditation (WCA):** Voluntary Accreditation system that provides an opportunity for cities that value their natural or human-made wetlands to gain international recognition and positive publicity for their efforts.
 - **Approved at Uruguay in COP12 of Ramsar Convention** (2015).
 - **Valid for 6 years**, after which it must be renewed, providing that it continues to **fill each of the 6 criteria**.

Outcomes of COP15

Outcome/Initiative	Description
“Victoria Falls” Declaration	Acknowledges ecological, social, and economic roles of wetlands; highlights contribution to biodiversity, climate change mitigation, and UN SDGs
5 th Strategic Plan 2025–2030	To halt and reverse the loss of wetlands across its Member States
Indo-Burma Ramsar Regional Initiative (IBRRI) Strategic Plan 2025–2030	<ul style="list-style-type: none">• Aim: To support implementation of objectives of Strategic Plan of Ramsar Convention.• Secretariat: IUCN• Supported by IUCN’s BRIDGE (Building River Dialogue and Governance) project.<ul style="list-style-type: none">○ BRIDGE aims to catalyse sustainable development of shared water resources, safeguard water security, conserve biodiversity, and promote peaceful cooperation across borders.• Member States: Cambodia, Lao PDR, Myanmar, Thailand and Vietnam.
BRIDGE Programme	Grants on gender mainstreaming and women leadership
Freshwater Challenge	To enhance implementation of the Convention
Endorsement of establishment of Global Waterbird Estimates Partnership (GWEP)	GWEP (under Ramsar Convention) integrates data sources, build monitoring capacity, provide information for conservation agreements to combat global decline of waterbird populations and wetland degradation.
India’s Contributions	<ul style="list-style-type: none">• Introduced "Promoting Sustainable Lifestyles for the Wise Use of Wetlands" resolution in line with Mission LiFE, which was passed.<ul style="list-style-type: none">○ This resolution encourages pro-planet behavioral changes at the individual and societal levels to support wetland preservation.• Elected as a member of the Standing Committee for the 2025–2028 triennium representing the South Asia region.• Indore and Udaipur awarded Wetland City Accreditation.<ul style="list-style-type: none">○ Indore: Sirpur Lake (Ramsar Site) recognised for water bird congregation and is being developed as a bird sanctuary.

- **Udaipur:** Surrounded by five major wetlands, namely, Pichola, Fateh Sagar, Rang Sagar, Swaroop Sagar, and Doodh Talai.

1.3.2.1. NEW RAMSAR SITES IN INDIA



Ramsar Site	Details
Khichan Wetland (Rajasthan)	<ul style="list-style-type: none"> ● Location: Northern Thar Desert, Phalodi ● Comprises 2 water bodies, Ratri nadi (river) and Vijaysagar talab (pond), riparian habitat and scrub land. ● Hosts wintering flocks of migratory demoiselle cranes (<i>Anthropoides virgo</i>).
Menar Wetland Complex (Rajasthan)	<ul style="list-style-type: none"> ● Location: Menar and Kheroda village, Udaipur ● A freshwater monsoon wetland complex formed by three ponds (Braham talab, Dhand talab and Kheroda talab). ● Notable bird species found here: critically endangered white-rumped vulture (<i>Gyps bengalensis</i>) and long-billed vulture (<i>Gyps indicus</i>).
Siliserh Lake (Rajasthan)	<ul style="list-style-type: none"> ● Location: Paitpur, Alwar District ● Lies in semi-arid zone and falls in the buffer region of Sariska tiger reserve. ● A human-made wetland, created in 1845 AD by Maharaja Vinay Singh by creating a bund across the tributary of River Ruparel.

Gokul Reservoir (Bihar)	<ul style="list-style-type: none"> Location: Buxar district An Oxbow Lake, on southern edge of Ganga River. Important habitat of Blackbuck.
Udaipur Lake (Bihar)	<ul style="list-style-type: none"> Location: West Champaran district. Oxbow Lake Surrounded by Udaipur Wildlife Sanctuary. An important wintering ground for many migratory bird species like pochard (Aythya ferina).
Gogabean Lake (Bihar)	<ul style="list-style-type: none"> Location: Katihar district An oxbow wetland, formed from flow of Mahananda and Kankhar in north and Ganga in the south and east 1st community reserve of Bihar.
Kopra Jalashay (Chhattisgarh)	<ul style="list-style-type: none"> Location: Bilaspur District A reservoir in upper catchments of the River Mahanadi. Features shallow nutrient-rich backwaters.

1.3.3. OTHER WETLANDS IN NEWS

Heading	Details
Vembanad lake	Recent report found its surface area has shrunk by 27% between 1917 and 1990. <ul style="list-style-type: none"> Largest brackish, humid tropical wetland ecosystem in Kerala. Supports 3rd largest waterfowl population in India during winter months. Vembanad Kol (Ramsar Site), Pathiramanal Island, Thanneermukkom salt water barrier located on it.
Dal Lake	It hosted the first-ever Khelo India water games. <ul style="list-style-type: none"> Location: Eastern part of the Srinagar in Jammu and Kashmir, on right bank of Jhelum. Part of a natural wetland includes its floating gardens. Fed by “Arrah” river, flows in a northerly extremity through a dark and deep channel called Tel Bal. Divided by causeways into four basins - Gagribal, Lokut Dal, Bod Dal, and Nagin.

1.3.4. CORAL BLEACHING

Why in the news?

Australia experienced record **coral bleaching** events, as part of the **4th mass coral bleaching event** (started in 2023) marked by most intense **marine heatwaves** across the Coasts.

About Corals

- Consist of **invertebrate animals** called **polyps** that live in **symbiotic relationship with algae** called **zooxanthellae** that provide them with nutrients through photosynthesis.
- Generally classified as either **hard coral (reef-building corals)** or **soft coral**.
 - Unlike hard corals, **soft corals do not have calcium carbonate skeletons**.
- Types of Coral Reefs:** **Fringing reef** (attached to shores), **Barrier reef** (separated from coast by a lagoon), and **Atoll reef** (ring-shaped with central lagoon).
- Optimal conditions for coral formation:** **23-29°C** temperature, **clear and shallow** waters less than **50 meters** for sunlight penetration, **stable salinity** etc.
- Coral Bleaching:** Occurs when corals are **stressed by changes in temperature, light, or nutrients** and **expel symbiotic algae living in their tissues**, causing them to turn **completely white** and **die** eventually due to loss of nutrient source.

- Significance of Coral Reefs:** Support ~25% of all marine species including filter feeders (filter contaminants E.g. sponges); protection of coasts from storms, erosion; economic value related to tourism, fisheries etc.
- Coral Conservation Technologies:** Biorock Technology (Uses electrical current to stimulate coral formation with deposition of calcium carbonate), 3D-Printed Reef Structures, Coral Cryopreservation (for future restoration); Philippines' coral larvae cryobank to preserve reef biodiversity by freezing coral 'seeds'.

Distribution of Coral reefs

- Globally:** Mostly located in tropical waters.
 - More than one-third located in Australia, Indonesia and Philippines.
 - World's largest coral reef system: Great Barrier Reef, Australia
- In India: Andaman and Nicobar Group of Islands (Largest); Lakshadweep, Gulf of Kachchh (Gujarat), Gulf of Mannar, Palk Bay; Malvan, Maharashtra (small scale)
- Coral Triangle (Amazon of the Seas):** World's richest marine biodiversity hotspot. (see infographic)



1.3.5. SUSTAINABLE AQUACULTURE IN MANGROVE ECOSYSTEMS (SAIME)

Why in the News?

Sustainable Aquaculture in Mangrove Ecosystems (SAIME) model, developed by **Nature Environment and Wildlife Society** has received **Global Technical Recognition** from the **UN's Food and Agriculture Organization (FAO)**

Sustainable Aquaculture in Mangrove Ecosystems (SAIME)

- A Multi-Stakeholder Partnership (MSP) to strengthen transformative processes in shrimp trade as a basis for the protection of mangrove ecosystems in South Asia.
- In Sunderbans, SAIME aims to build a resilient ecosystem standardizing a **practice of culture methodology of brackish water aquaculture**.
- Funding:** Global Nature Fund (GNF) in consortium with Naturland e.V. and Mercedes Benz.
- Operationalizes the **Integrated Mangrove Aquaculture (IMA)** which aims to promote extensive culture of low stocking densities with no additional feed input.

Mangroves and their Significance

- A salt-tolerant plant community found in tropical and subtropical intertidal regions.
 - They thrive in high-rainfall areas (1,000–3,000 mm) with temperatures ranging from 26°C to 35°C.
- Characteristics:**
 - Unique root systems, such as **pneumatophores** and **prop/stilt roots**
 - Viviparous: Seeds germinate while they are still on the maternal plants.
- Significance:** Nature's Carbon Vault (store 7.5–10 times more carbon per acre than tropical forests); Provide critical habitat for nursery for fish, crabs; Kidney of nature (Filter sediments); Natural shield against extreme weather events E.g. storm surges; Prevent erosion and stabilize coasts

Mangroves in India

- Total mangrove cover: 4,991.68 sq. km., 0.15%** of country's total geographical area. (India State of Forest Report 2023 (ISFR-2023))
- India recorded an **11.4% net increase** in mangrove cover between 2001 and 2023.
- West Bengal** holds the largest share of India's mangroves (**42.45%**), followed by **Gujarat (23.32%)** and **Andaman & Nicobar Islands (12.39%)**.

- Sundarbans Mangroves, on the delta of **Ganges, Brahmaputra and Meghna** rivers on the Bay of Bengal are the **only mangrove forest** globally (besides Bangladesh) to harbour a significant **tiger population**.
- **Regional initiatives for conservation:** TN-SHORE, largely funded by the World Bank, designed to strengthen Tamil Nadu's coastal economy and resilience.

1.4. OTHER IMPORTANT NEWS

Topic	Detail
Island Protection Zone (IPZ)	<p>MoEFCC extended the validity of infrastructure projects approved under the 2011 Islands Protection Zone (IPZ) notification.</p> <ul style="list-style-type: none">● IPZ is a regulatory framework to safeguard the ecological integrity of Andaman & Nicobar and Lakshadweep groups of islands.<ul style="list-style-type: none">○ It is similar to the Coastal Regulation Zone (CRZ) except that CRZ is notified for the protection of coastal areas of mainland India.● Notified in 2011 under the Environment (Protection) Act, 1986.● Regulation includes:<ul style="list-style-type: none">○ Island Coastal Regulation Zone (ICRZ) for Middle Andaman, North Andaman, South Andaman, Little Andaman, etc.○ Integrated Islands Management Plans (IIMPs) applicable to all other islands of Andaman and Nicobar and all islands of Lakshadweep.
United Nations Forum on Forests	<p>India participated in the 20th session of the United Nations Forum on Forests (UNFF) held in New York, reaffirming its commitment to the United Nations Strategic Plan for Forests 2017–2030.</p> <ul style="list-style-type: none">● Established by: UN Economic and Social Council of the United Nations (ECOSOC) Resolution 2000/35 in October 2000.● Main Objective: To promote the management, conservation, and sustainable development of all types of forests and reinforce long-term political commitment.● Membership: Includes all UN member states and specialized agencies.
Third United Nations Ocean Conference (UNOC3)	<p>The third United Nations Ocean Conference (UNOC3) held in Nice, France and co-hosted by France and Costa Rica concluded with the adoption of the Nice Ocean Action Plan.</p> <ul style="list-style-type: none">● First UNOC was held in 2017 and the second was held in 2022.Key Highlights of Action Plan<ul style="list-style-type: none">● Three main Priorities:<ul style="list-style-type: none">○ Working towards successful conclusion and implementation of international agreements, such as the High Seas Treaty (BBNJ Agreement).○ Scaling up funding for SDG 14 (Life below water) and supporting a sustainable Blue Economy.○ Increasing and disseminating marine science knowledge to inform policy-making and supporting the creation of the International Panel for Ocean Sustainability (IPOS).● Reaffirms commitment to develop an international legally binding instrument on plastic pollution and reduce climate and acidification impacts on oceans and coastal communities reliant on them.
International Blue Flag Certification	<p>Five Maharashtra Beaches, namely, Shrivardhan, Nagaon, Parnaka, Guhagar and Ladghar received the prestigious International Blue Flag Certification.</p> <ul style="list-style-type: none">● A globally recognized eco-label awarded to beaches, marinas, and tourism boats.● Total beaches in India: 18, highest in Maharashtra● Based on rigorous requirements in the areas of accessibility, education, environmental performance, responsible behavior, safety, services, stakeholder engagement and water quality.

	<ul style="list-style-type: none"> Awarded by: Foundation for Environmental Education (FEE) of Denmark since 1985. Criteria: Awarded to beaches that meet 33 criteria related to cleanliness, beauty, and environmental sustainability. 	<h2>Blue Flag beaches</h2> <p>The map shows the coastline of India with pins indicating the locations of 20 Blue Flag beaches. The locations are: Shivrajpur Beach (Dwarka - Gujarat), Ghoghal Beach (Diu), Nagaon Beach (Maharashtra), Guhagar Beach (Maharashtra), Parnaka Beach (Maharashtra), Ladghar Beach (Maharashtra), Shrivardhan Beach (Maharashtra), Rushikonda Beach (Andhra Pradesh), Golden Beach (Puri - Odisha), Kasarkod Beach (Karnataka), Padubidri Beach (Karnataka), Kadmat Beach (Lakshadweep), Minicoy Thundi (Lakshadweep), Chal Beach (Kerala), Kovalam Beach (Tamil Nadu), Eden Beach (Puducherry), Kappad Beach (Kerala), and Radhanagar Beach (Andaman & Nicobar Islands).</p>
AIM4NatuRe (Accelerating Innovative Monitoring for Nature Restoration)	<ul style="list-style-type: none"> Launched by: The Food and Agriculture Organization (FAO) on Earth Day (22nd April) Aim: To improve monitoring and reporting of global ecosystem restoration efforts. Initiative leverages cutting-edge technology, standardized data frameworks, and capacity development to restore at least 30% of degraded ecosystems by 2030, as outlined in Target 2 of the Global Biodiversity Framework (GBF). Part of FAO's AIM4Forests Programme, expanding the scope beyond forests to provide a holistic approach to nature restoration monitoring. 	
Central Asian Mammals Initiative (CAMI)	<p>Central Asian countries have come together under CAMI to protect 17 shared species like Saiga, Bukhara Deer etc.</p> <ul style="list-style-type: none"> CAMI was launched in 2014 at the 11th Meeting of the Conference of the Parties (COP11) to the Convention on the Conservation of Migratory Species of Wild Animals (CMS). Objective: To coordinate conservation efforts for 17 key migratory mammal species in Central Asia. 	
Blue Pinkgill and Shuttlecock Mushrooms	<p>Rare Blue Pinkgill and Shuttlecock Mushrooms were recently spotted in Telangana forests.</p> <ul style="list-style-type: none"> Blue Pinkgill Mushroom: <ul style="list-style-type: none"> Native to New Zealand. Derives color from azulene, pigment rare in fungi but common in some flowers and plant. Spotted in Kadamba Reserve Forest and other areas of the Kagaznagar forest division, known for rich monsoon-driven fungal diversity. Shuttlecock Mushroom <ul style="list-style-type: none"> Recorded in Kawal Tiger Reserve. Marks the first confirmed sighting in Eastern Ghats, extending its known range beyond Western Ghats and western India. 	

	<ul style="list-style-type: none">○ Crisscross lattice structure helps release spores into the air.
AviList	<p>The first-ever unified global checklist of bird species to aid effective bird conservation.</p> <ul style="list-style-type: none">● Collaborative global effort that included representatives from BirdLife International, the Cornell Lab of Ornithology, the American Ornithologists Society, the International Ornithologists' Union, and Avibase.● It will replace the International Ornithological Committee (IOC) and Clements lists and will be updated annually.

1.5. TERMS/CONCEPTS IN NEWS

1.5.1. CONSERVATION RESERVE

State Government has notified Hesaraghatta Grassland Conservation Reserve under Section 36A of the Wildlife Protection Act (WPA) 1972.

About Conservation Reserve

- Considered a **protected area under WPA 1972** and can be **declared by State Governments and Central Government** for protecting landscapes, seascapes, flora and fauna.
- Typically act as **buffer zones to or connectors and migration corridors** between established national parks, wildlife sanctuaries and reserved and protected forests of India
- **Regulation:** Conservation Reserve Management Committee, appointed by the state Government, advises Chief Wild Life Warden.

About Hesaraghatta Grassland

- **Location:** Around Hesaraghatta Lake near Bengaluru in Karnataka and is the last remaining grassland habitat in Bengaluru region.
 - Grasslands—or open regions are dominated by grass and characterised by warm, dry climate—are one of the most widely distributed terrestrial biomes globally.
- **Large catchment of the Arkavathy River**, Thippagondanahalli reservoir and Hesaraghatta lake.

1.5.2. GLOBAL OCEAN DARKENING

A study found that **21% of the global ocean had become darker** between 2003 and 2022, especially in the Arctic, Antarctic, and Gulf Stream region.

About Darkening of the Ocean

- It refers to a **reduction in light penetration** into the global oceans, **shrinking the photic zone**.
 - The photic zone is the **sunlit layer (about 200 meters in depth)** where most marine life (nearly 90%) thrives.
- **Reasons:**
 - **In Coastal Oceans:** Combination of **nutrient, organic material and sediment loading due to agricultural runoff and increased rainfall**.
 - **In Open Oceans:** warming of the surface oceans (leading to algal bloom) and climate-driven changes in the ocean circulation patterns.
- **Impact:** Limits Ocean productivity by limiting light-dependent processes like reproduction, photosynthesis, etc., declining fish stock impacts fisheries industry, affects climate regulation.

1.5.3. ENVIRONMENTAL DNA

Scientists are now focusing on modern tools like environmental DNA (eDNA) analysis for **biodiversity conservation**.

About Environmental DNA

- It is the **genetic material**, like **DNA from cells, tissues, fluids, and excrement, left by organisms** in the environment (e.g., water, soil, Air, etc.).
- Application:** Mapping species presence and distribution, tracking Ecosystems, etc.
- Significance:** **Non-invasive, highly sensitive, rapid and cost-effective** compared to other biomonitoring methods.

1.5.4. BLUE WASHING

To counter ‘greenwashing’ allegations against it, Waste to energy (WTE) industry seems to have **adapted ‘blue washing’**.

About Blue Washing

- It is a **deceptive marketing tactic** that overstates a company's commitment to responsible and sustainable social and ethical business practices.
- Other related terms:**
 - Greenwashing:** Making false or misleading claims about a company's environmental efforts to appear eco-friendly.
 - Pinkwashing:** Using LGBTQ+ rights as a marketing tool while ignoring or failing to improve conditions for LGBTQ+ employees.

1.5.5. FUNCTIONAL DE-EXTINCTION

A US biotech company, **Colossal Biosciences**, claims to have genetically engineered three grey wolf pups to carry traits of the extinct dire wolf, calling it **world's first successful functional de-extinction**.

- Dire wolves (*Aenocyon dirus*) were large canines that dominated southern Canada and US before they went extinct about 13,000 years ago.
- Other animals for planned Functional De-extinction:** Wooly mammoth, moa, thylacine, dodo.

About Functional De-extinction

- It focuses on **reviving ecological roles and traits** of extinct species.
- Revived organisms are **not exact replicas** but genetically engineered to closely **resemble** extinct species in form or function.
- Techniques used:** CRISPR gene editing, cloning, and genome mapping.

1.5.6. UNGULATES

Wildlife Institute of India and National Tiger Conservation Authority did India's first survey of ungulates (hoofed animals), warning of their decline in Odisha, Jharkhand, and Chhattisgarh.

About Ungulates

- Habitat:** Grasslands, Forests and mountainous regions.
- Characteristics:** Primarily herbivores mammals including chital, antelopes, sambar, nilgai, etc.; Prey species for tigers.
- Significance:** Aid forest/grassland regeneration through seed dispersal; nutrient cycling; soil health, etc.



1.6. ORGANIZATIONS IN NEWS

1.6.1. CONVENTION ON INTERNATIONAL TRADE IN ENDANGERED SPECIES OF WILD FAUNA AND FLORA (CITES)



Convention on International Trade in Endangered Species of Wild Fauna and Flora



Aim: Voluntary international agreement between governments ensuring international trade in wild animals and plants does not threaten their survival.

► Legally binding on Parties, but does not take the place of national laws.



Genesis: Drafted in 1963 following an IUCN resolution, came to force in 1975.



Parties: 185 parties (including India - ratified in 1976)



Conference of Parties (CoP): Highest Decision-making body (CoP3, 1981 held in New Delhi).



CITES Three Appendices: based on degree of protection needed

► **Appendix I:** Species threatened with extinction, trade permitted in only exceptional cases.

► **Appendix II:** Species not necessarily threatened with extinction, but trade must be controlled.

► **Appendix III:** Species protected in at least one country, which has asked other CITES Parties for assistance in controlling the trade.



Key Initiatives of CITES: MIKE Programme to monitor illegal killing of elephants; CITES Tree Species Programme (CTSP); International Consortium on Combating Wildlife Crime (ICCWC), 2010.



Report: World Wildlife Trade Report

1.6.2. INTERNATIONAL UNION FOR THE PROTECTION OF NEW VARIETIES OF PLANTS (UPOV)



International Union for the Protection of New Varieties of Plants



Aim: An intergovernmental organization to provide and promote an effective system of Plant Variety Protection (PVP).



Genesis: Established in 1961



Function: Grants Breeder's Rights (an IP right) to incentivize the development of new, improved plant varieties for agriculture and food security.



UPOV Convention 1991: It strengthens breeders' rights and makes the farmer's privilege (to save seeds) optional for member countries.



India's Status: Not a member and uses its own sui generis law, the Protection of Plant Varieties and Farmers' Rights Authority Act, 2001, which uniquely protects both breeder and farmer's rights.

1.6.3. IBAT ALLIANCE



Integrated Biodiversity Assessment Tool



About: A coalition of four organizations: Birdlife International, Conservation International, The International Union of Conservation for Nature (IUCN), The United Nations Environment Programme - World Conservation Monitoring Centre (UNEP-WCMC).



Genesis: Founded in 2008.



Mission: To provide data, tools and guidance that help organisations act on biodiversity-related risks etc.

1.6.4. NATIONAL GREEN TRIBUNAL (NGT)



National Green Tribunal



About: A Statutory and specialized body aimed at effective and expeditious disposal of cases relating to environmental protection and conservation of forests and other natural resources.



Genesis: Established in 2010 under the **NGT Act, 2010** to adjudicate environmental cases.



Headquarters and Principal Place of Sitting: New Delhi

- ▷ Other four places of sitting: Bhopal, Pune, Kolkata and Chennai



Powers: Has power of a Civil Court under Code of Civil Procedure, 1908.

- ▷ **Not bound by the procedures** of Code of Civil Procedure, 1908 or the Indian Evidence Act, 1872.
- ▷ **Guided by Principles of Natural Justice.**
- ▷ Mandated to dispose applications/appeals finally **within 6 months** of filing.



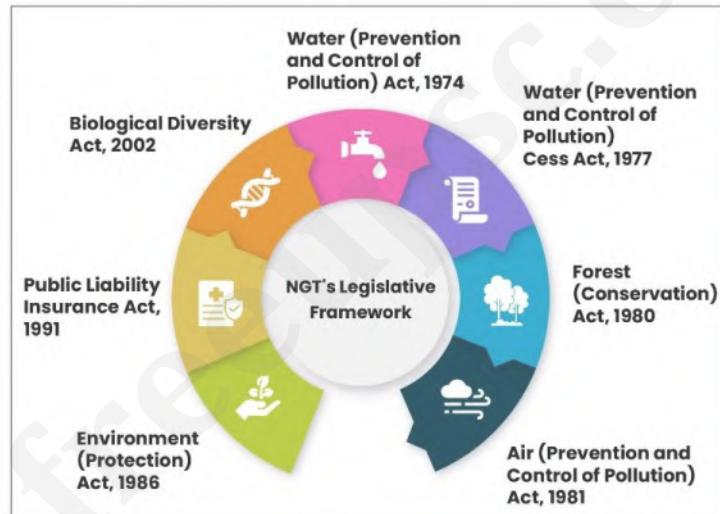
Members: Hold office for 5 years, but shall not be eligible for re-appointment.



Eligibility of Chairperson: Judge of the Supreme Court or Chief Justice of a High Court.



Appeal: Orders are **binding but not final** (it can review its judgements or an appeal could be made in SC within ninety days.)



1.7. RELATED REPORTS/INDICES IN NEWS

Report/Indices	Detail
Global Forest Resources Assessment (GFRA) 2025	<ul style="list-style-type: none"> Released by: FAO, every 5 years This year's edition published during Global Forest Observations Initiative (GFOI) Plenary in Bali, Indonesia. <ul style="list-style-type: none"> GFOI is a flagship programme of the Group on Earth Observations (GEO) (India is a member). Key highlights <ul style="list-style-type: none"> Forests cover 32% of global land area. Nearly half of the world's forests are located in tropics, followed by boreal, temperate and subtropical domains. Europe has the largest forest area, accounting for 25% of world's total. India's Forest Extent: Moved up one rank to 9th position in terms of total forest area globally, accounting for 2% of global forest area; Ranks 5th in terms of rubber plantation.



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फाउंडेशन कोर्स सामान्य अध्ययन

प्रारंभिक एवं मुख्य परीक्षा 2027

इनोवेटिव क्लासरूम प्रोग्राम

- प्रारंभिक परीक्षा, मुख्य परीक्षा और निबंध के लिए महत्वपूर्ण सभी टॉपिक का विस्तृत कवरेज
- मौलिक अवधारणाओं की समझ के विकास एवं विश्लेषणात्मक क्षमता निर्माण पर विशेष ध्यान
- एनीमेशन, पॉवर प्याइंट, वीडियो जैसी तकनीकी सुविधाओं का प्रयोग
- अंतर - विषयक समझ विकसित करने का प्रयास
- योजनाबद्द तैयारी हेतु करेट ओरिएंटेड अप्रोच
- नियमित क्लास टेस्ट एवं व्यक्तिगत मूल्यांकन
- प्री फाउंडेशन कक्षाएं
- सीसैट कक्षाएं
- PT 365 कक्षाएं
- MAINS 365 कक्षाएं
- PT टेस्ट सीरीज
- मुख्य परीक्षा टेस्ट सीरीज
- निबंध टेस्ट सीरीज
- सीसैट टेस्ट सीरीज
- निबंध लेखन - शैली की कक्षाएं
- करेट अफेयर्स मैगजीन

नोट: ऑनलाइन छात्र हमारे पाठ्यक्रम की लाइव वीडियो कक्षाएं अपने घर पर ऑनलाइन लेटफॉर्म पर देख सकते हैं। छात्र लाइव वैट विकल्प के माध्यम से कक्षा के दौरान अपने संदेह और विषय संबंधी प्रश्न पूछ सकते हैं। वे अपने संदेह और प्रश्न नोट भी कर सकते हैं और दिल्ली केंद्र में हमारे कक्षा सलाहकार को बता सकते हैं और हम फोन/मेल के माध्यम से प्रश्नों का उत्तर देंगे।

DELHI: 25 नवंबर, 11 AM | 12 जनवरी, 11 AM

JAIPUR: 10 दिसंबर

JODHPUR: 2 दिसंबर

2. CLIMATE CHANGE

2.1. UNFCCC COP30

Why in News?

The 30th Conference of Parties (COP30) to United Nations Framework Convention on Climate Change (UNFCCC) was held in Belém, Brazil which coincided with the 10th anniversary of the Paris Agreement.

About UNFCCC COP30

- Hosted in the Amazon region, the summit was framed as the "COP of Implementation", "COP of Truth", and the "Forest COP", rooted in the "spirit of Mutirão" (inclusion and balance).
- It concluded with adoption of Belem Package, by 195 Parties, including agreements on topics such as just transition, adaptation finance, trade, gender, and technology etc.
- Key meetings included: COP 30 (UNFCCC), CMP 20 (Conference of the Parties serving as the Meeting of the Parties to the Kyoto Protocol) & CMA 7 (Conference of the Parties serving as the meeting of the Parties to the Paris Agreement).



United Nations Framework Convention on Climate Change



Bonn, Germany

Genesis: It emerged from **1992 Earth Summit at Rio de Janeiro**, adopted in 1994.

- ▶ It is one of the **three sister conventions (Rio Conventions)**, the other two being UN Convention on Biological Diversity (**UNCBD**) and UN Convention to Combat Desertification (**UNCCD**).
- ▶ The **first COP** meeting of the **UNFCCC** was held in **Berlin, Germany, 1995**.

Signatories: 198 (**India** is a member)

Report: NDC Synthesis Report

Outcome	Launched By/Under	Primary Purpose
 Implementation Work Programme (Mutirão Decision)		
Belém Mission to 1.5°C	COP29-COP31 Troika (UAE, Azerbaijan, Brazil)	Action-oriented platform to foster enhanced ambition and international cooperation across mitigation, adaptation, and investment
Global Implementation Accelerator	COP 30 & 31 Presidencies	Voluntary initiative to support countries in implementing their NDCs and National Adaptation Plans (NAPs)
National Adaptation Plans (NAPs) Implementation Alliance	UNDP, Italy, Germany, NAP Global Network, NDC Partnership	<ul style="list-style-type: none">Launched as a new PAS (Plan to Accelerate Solutions) under the COP 30 Action Agenda.Supports implementation of NAPs and mobilize public and private investment to advance national adaptation priorities
 Forests & Nature		
Tropical Forest Forever Facility (TFFF)	<ul style="list-style-type: none">Endorsed by Brazil, Indonesia, DRC, China	<ul style="list-style-type: none">Establish a \$125B fund Tropical Forest Investment Fund (TFIF) that pays tropical forest countries for maintaining and expanding

	etc. (India joined as an Observer) <ul style="list-style-type: none"> Trustee and Interim host: World Bank 	tropical and subtropical moist broadleaf forests. <ul style="list-style-type: none"> Aims to mobilise \$25 billion from member countries and attract up to \$100 billion from private investors. Mandates at least 20% of all payments flow directly to Indigenous Peoples and Local Communities.
Resilient Agriculture Investment for net-Zero land degradation (RAIZ) Accelerator	Brazil & 10 Partner Nations <ul style="list-style-type: none"> Hosted by Brazil under the FAO FAST Partnership 	<ul style="list-style-type: none"> To restore 3 million hectares of degraded farmland using blended finance and private capital. Based on "Green Way and Eco Invest in Brazil". Coordinated by: FAO, Food and Land Use Coalition (FOLU), Consultative Group on International Agricultural Research (CGIAR), G20 Land Restoration Initiative, World Bank
Scaling J-REDD+ Coalition (Jurisdictional Reducing Emissions from Deforestation and forest Degradation+)	UK, Singapore, Costa Rica, Ethiopia, Ghana, Guyana, Kenya etc.	<ul style="list-style-type: none"> A new coalition of governments, Indigenous People, investors, standard setters, and civil society etc. Offers a credible, mature pathway to mobilize \$3–6 billion per year by 2030 to halt and reverse tropical deforestation.



Finance & Economy

Baku to Belém Roadmap to 1.3T	COP 29 & 30 Presidencies	The official pathway to mobilize the New Collective Quantified Goal (NCQG) of \$1.3 trillion/year by 2035.
Tripling of adaptation finance	-	Increase adaptation finance to \$120 billion per year , as part of the broader \$300 billion per year in climate finance for developing countries (part of New Collective Quantified Goal (NCQG)).
Measurement framework for tracking adaptation progress under the Global Goal on Adaptation (GGA)	-	<ul style="list-style-type: none"> Indicators adopted across 7 thematic sectors: water, food, health, ecosystems, infrastructure, poverty, and culture. Formalizes a four-stage cycle for countries to assess, plan, implement, and monitor their adaptation efforts. Global Goal on Adaptation (GGA) was established under Article 7.1 of the Paris Agreement (2015) <ul style="list-style-type: none"> Objective: A shared global ambition to ensure an adequate adaptation response alongside the 1.5°C temperature goal. The UAE Framework for Global Climate Resilience: Adopted at COP28 to operationalize the GGA, setting specific 2030 targets.
Baku Adaptation Roadmap	-	Approves and establishes the work for 2026-2028, until the next Global Stocktake of Paris Agreement.

FINI (Fostering Investible National Implementation)	Supported by: Inter-American Development Bank (IDB) and the Green Climate Fund (GCF)	<ul style="list-style-type: none"> • Make National Adaptation Plans (NAPs) investible and implementation-ready. • Develop project pipelines of USD 1 trillion in adaptation investment pipelines by 2028, with 20% coming from private investors • Led by: Atlantic Council's Climate Resilience Center and Natural Resources Defense Council
Open Coalition on Compliance Carbon Markets	Brazil, China, EU, UK Canada, Germany, Singapore etc.	Initiative to harmonize carbon pricing and integrity standards across national borders and collaborate in defining best practices for Monitoring, Reporting, and Verification (MRV) .
Belem Declaration for Green Industrialization	35 countries and organisations (such as UNDP, UNIDO) etc.	Accelerating decarbonization of heavy emitting industries and promoting green industrialization in pursuit of global climate and development goals



Energy & Infrastructure

Plan to Accelerate the Expansion and Resilience of Power Grids	Green Grids Initiative (GGI)	Coordinate relevant stakeholders towards grid expansion and a renewables-powered future.
Plan to Accelerate Coal Transitions (PACT)	Powering Past Coal Alliance (PPCA)	Roadmap to fast-track the transition from coal to clean energy while ensuring energy security.
Belém 4x Pledge on Sustainable Fuels	Italy, Japan, India and Brazil etc. • International Energy Agency (IEA) will track progress	Quadruple the use of sustainable fuels (hydrogen, biofuels, e-fuels) by 2035 compared to 2024 levels.



Social & Health

Belém Health Action Plan	>30 countries & 50 organizations	<ul style="list-style-type: none"> • World's first international climate adaptation plan dedicated to health • \$300 million initial funding to build climate-resilient health sector especially in the Global South.
Belém Gender Action Plan (GAP)	Adopted by Parties at COP30 for 2026–2034	Designed to implement Lima Work Programme on gender
Declaration on Information Integrity on Climate Change	Global Initiative for Information Integrity on Climate Change • Endorsed by Brazil, Canada, Chile, Denmark, etc.	<ul style="list-style-type: none"> • Establishes shared international commitments to address climate disinformation (information pollution) and promote accurate, evidence-based information on climate issues. • First time the topic of information integrity has been included in the COP Action Agenda.
Belém Declaration on Hunger, Poverty, and People-Centered Climate Action	Signed by 43 countries and the European Union	To promote actions that address the unequal ways climate change affects populations worldwide, particularly the most vulnerable.



Emergency Action

2030 Strategy	Climate Risk and Early Warning Systems (CREWS)	Enabling climate-vulnerable nations to build early warning systems
Call to Action on Integrated Fire Management and Wildfire Resilience	Brazil	Acknowledges International cooperation for integrated fire management

2.1.1. OTHER IMPORTANT OUTCOMES OF COP30

Initiative/Coalition/Outcome	Launched by	Details
Systematic Observation Impact Bond	Systematic Observations Financing Facility (SOFF), a United Nations fund created by UNEP, WMO and UNDP	<ul style="list-style-type: none"> World's first impact bond on weather and climate data Aim: Finance instrument to strengthen resilience and early warnings worldwide. Seeks initial capitalization of USD 200 million by end of 2026. Help 30 Least Developed Countries (LDCs) and Small Island Developing States (SIDS) meet Global Basic Observing Network (GBON) standards.
Climate and Health Funders Coalition (CHFC)	Private funders like Bloomberg Philanthropies, Gates Foundation, etc.	<ul style="list-style-type: none"> Committed an initial \$300 million for integrated action to tackle climate change and its consequences on health. Immediate focus: Extreme heat, Air pollution, Climate sensitive infectious diseases, Critical climate and health data for decision makers.
Plan to Accelerate the Solution (PAS) on Multilevel Governance	Coordinated by COP30 Presidency, Brazil's Ministries of Environment and Cities, and UN-Habitat.	<ul style="list-style-type: none"> Targets integration of multilevel structures into 100 countries Nationally Determined Contribution (NDCs) by 2028 and 120 by 2030.
Global Mutirão Against Extreme Heat / Beat the Heat Implementation Drive	COP30 Presidency and UNEP-led Cool Coalition	<ul style="list-style-type: none"> Joined by 185 cities in implementing heat action plans and nature-based solutions (e.g., urban forests, green roofs) Aim: To reduce heat risks for 3 billion people globally and integrate solutions into 50 national adaptation frameworks by 2030. 72 nations endorsed Global Cooling Pledge (reduce cooling-related emissions by 68% by 2050).
Food Waste Breakthrough	Led by UNEP	<ul style="list-style-type: none"> Launched as a 2030 Climate Solution under Marrakech Partnership for Global Climate Action. Target: Halving global food waste and up to 7% reduction in methane emissions by 2030. Funding Support: Global Environment Facility Participation: Country champions include Brazil, Japan and the United Kingdom

Oceans Breakthroughs Dashboard	-	Track progress in 5 ocean sectors, namely marine conservation, renewable energy, shipping, aquatic food, and coastal tourism to help cut emissions by up to 35% by 2050
Global network of regenerative seascapes	One Ocean Partnership	Designed to mobilize at least USD 20 billion for a Regenerative Blue Economy.
Marine Biodiversity and Ocean Health (MBOH) toolkit	-	To enable stakeholders to take informed action to protect marine biodiversity and economic resilience.
No Organic Waste (NOW)	Supported by Global Methane Hub	Commits to cutting 30% of methane emissions from organic waste by 2030.
Indigenous Land Tenure Commitments (ILTC)	15 Governments	Set a goal to advance ownership and protection of 160 million hectares of land for Indigenous and Afro-descendant groups.
Global Carbon Harvest Coalition	Brazil, India, and Kenya's national agricultural research institutions	Accelerate and scale field research on soil organic carbon, biochar, and enhanced rock weathering.
Brazilian Sustainable Taxonomy (BST)	-	Launched to define sustainable investments.
Integrated Forum on Climate Change and Trade (IFCCT)	-	To help countries collectively explore practical approaches to make trade a driver of a just, sustainable and inclusive transition.
Utilities for Net Zero Alliance (UNEZA)	Established at COP28 with adoption of UAE Declaration of Action	It raised its annual investment targets to USD 148 billion at COP30. Members aim to invest ~USD 1 trillion by 2030 to expand clean energy and modernize power grids.
Super Pollutant Country Action Accelerator	Climate and Clean Air Coalition (CCAC)	3-year programme to help governments in ODA-eligible countries to drive deep and sustained reductions in super pollutant (methane, black carbon, HFCs, tropospheric ozone) emissions.

2.1.2. OTHER IMPORTANT INITIATIVES AT COP30

Country or Regional Platforms for Climate and Nature Finance	<p>At the COP30, India along with 12 other developing countries and African Islands States Climate Commission (AISCC) announced plans to develop 'Country or Regional Platforms for Climate and Nature Finance'.</p> <ul style="list-style-type: none"> They are strategic, country-driven mechanisms that translate climate priorities into programmatic investment approaches. Funding: Supported under the Green Climate Fund's (GCF) Readiness Programme. <ul style="list-style-type: none"> It is the largest climate action capacity-building facility for developing countries. GCF funds already support two existing platforms, the Brazil Country Platform and the Caribbean Regional Platform.
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	<div style="text-align: center;">  <h3>Green Climate Fund</h3>  <p>About: World's largest climate fund, mandated to support developing countries to raise and realize their Nationally Determined Contributions towards low-emissions, climate-resilient pathways.</p> <p>Genesis: Established at COP 16 of UNFCCC held in Cancun, 2010.</p> <p>Other Key Information:</p> <ul style="list-style-type: none"> ▷ Serves the Paris Agreement in accordance with Article 9. ▷ Mandated to invest 50% of its resources to mitigation and 50% to adaptation in grant equivalent. ▷ Provide financial support through flexible combination of grant, concessional debt, guarantees or equity instrument. </div>
ARISE (Accelerating Investments in Resilience and Innovations for Sustainable Economies)	<p>At COP30, Germany and Spain provided contribution of USD 100 million for the ARISE (Accelerating Investments in Resilience and Innovations for Sustainable Economies) investment program</p> <ul style="list-style-type: none"> • Implemented through Climate Investment Funds (CIF): Leading multilateral climate finance partnership that channels concessional finance through six multilateral development banks (MDBs) to support climate action. <ul style="list-style-type: none"> ○ CIF comprises two funds: the Clean Technology Fund (CTF) and the Strategic Climate Fund (SCF). • Implementing partners: World Bank Group, including the International Finance Corporation, the African Development Bank, the Asian Development Bank, the European Development Bank, and the Inter-American Development Bank.
Blue Nationally Determined Contributions (NDC) Challenge	<p>Six countries joined the Blue NDC Challenge during UNFCCC COP30.</p> <ul style="list-style-type: none"> • Launched by Brazil and France, it calls on all countries to place the ocean at the heart of their NDCs ahead of COP30. • Supported by: Ocean Conservancy, the Ocean & Climate Platform, and the World Resources Institute through the Ocean Resilience and Climate Alliance (ORCA). • Role of Ocean in addressing climate crisis: <ul style="list-style-type: none"> ○ Carbon sink: Carbon Dioxide Absorption and sequestration by mangroves and seagrasses (up to 4 times higher than terrestrial forests). ○ Heat Regulation: Oceans capture about 90% of the excess heat generated by greenhouse gas emissions. • Renewable Energy: Offshore wind energy.
Leadership Group for Industry Transition (LeadIT)	<p>Union Environment Minister of India addresses Leadership Group for Industry Transition (LeadIT) Industry Leaders' Roundtable at CoP30, Belém, Brazil.</p> <ul style="list-style-type: none"> • Launched jointly by India and Sweden and supported by the World Economic Forum at the UN Climate Action Summit in 2019. • Aim: First global high-level initiative aimed to achieve net-zero carbon emissions from high-emitting industries by 2050. • LeadIT 2.0 (2024-2026) was adopted at the annual LeadIT Summit at COP28. • Members: 18 member countries and 27 companies.

2.2. CLIMATE MITIGATION AND ADAPTATION

2.2.1. NATIONALLY DETERMINED CONTRIBUTIONS (NDCS)

Why in the news?

India will publish its revised **Nationally Determined Contribution (NDC)** for the 2035 period by December.

About Nationally Determined Contribution (NDC)

- Each Party to the Paris Agreement is required to establish an **NDC** and **update it every 5 years.**
- India submitted its first **NDC** in 2015, updated in 2022.

Other Related concepts

- India's Panchamrit:** Committed in CoP26 held at Glasgow
 - Reach **500 GW Non-fossil energy capacity** by 2030.
 - Meet **50% of its energy requirements** from renewable energy by 2030.
 - Reduction of total projected carbon emissions by **one billion tonnes from now to 2030.**
 - Reduction of the **carbon intensity of the economy by 45%** by 2030, over 2005 levels.
 - Achieving the target of **net zero emissions by 2070.**
- India's Long-Term Low-Carbon Development Strategy (LT-LCDC)**
 - LT-LDC are submitted to UNFCCC.
 - India submitted it in 2022 mentions that financial resources will be required to install renewable power plants, upgrade the transmission grid, and introduce energy storage systems, etc.

NDC: Quantitative Targets for 2030

Target Parameter	Previous NDC, 2015	Updated NDC, 2022	Progress
Reduce the emissions intensity of its GDP from 2005 level.	33 to 35%	45%	Reduced by 36% between 2005 and 2020
Cumulative electric power installed capacity from non-fossil fuel-based energy.	40%	50%	Achieved • 51% (September 2025)
Create additional carbon sink through additional forest and tree cover.	2.5 to 3 billion tonnes of CO ₂ equivalent	Same as 2015	

NOTE: India in its updated NDC, 2022 has included a component of mass movement for 'LIFE' – 'Lifestyle for Environment' as a key to achieving one of its Quantitative targets.

2.2.2. GREENHOUSE GASES EMISSION INTENSITY (GEI) TARGET RULES, 2025

Why in the News?

Union Environment Ministry notified the Greenhouse Gases Emission Intensity (GEI) Target Rules, 2025.

About the Rules

- Proposes **legally binding GHG emission targets** for over 400 industrial units.
- It notified **GEI Targets for four energy-intensive sectors** (aluminium, cement, chlor-alkali, and pulp & paper) ensuring emission cuts.
 - Targets for 5 additional sectors:** iron and steel, fertilizer, petroleum refining, petrochemicals, and textiles, covering over 460 additional industrial installations were also established separately.
- GEI means** Greenhouse Gases Emission Intensity in **tCO₂e/equivalent (tonnes of Carbon Dioxide equivalent)** output or product.
 - Emissions Intensity measures **GHG emitted per unit of output**—indicating carbon efficiency.
 - El doesn't always mean total emissions are falling, it reflects cleaner production progress.
- GEI Targets Calculation** as per **Bureau of Energy Efficiency's methodology**, specific to each **obligated entity** as listed in the Schedule.
- Obligated Entities** must **meet GEI targets annually** as per the **Carbon Credit Trading Scheme, 2023.**
 - May also purchase **carbon credit certificates** from the **Indian Carbon Market (ICM)** to offset shortfalls.
- Environmental Compensation** to be imposed by **Central Pollution Control Board (CPCB)**, equal to **twice** the average price at which **carbon credit certificate** is traded in the compliance year, payable within **90 days.**
- Non-compliance addressed under **Environmental Protection Act, 1986.**

About Carbon Credit Trading Scheme (CCTS)

- **Goal:** Lower GHG emissions by promoting carbon pricing (i.e., imposes a cost on GHG emissions)
- Notified under **Energy Conservation Amendment Act (ECA), 2022**
- Operates as an **intensity-based baseline-and-credit system**, with targets defined as tonnes of CO₂ equivalent per unit of product output.
- Scheme **covers both direct emissions from fuel combustion and industrial processes** (Scope 1) and **indirect emissions from electricity and heat consumption** (Scope 2).
 - The system initially covers CO₂ and perfluorocarbons (PFCs).
- **Key elements:**
 - **Compliance Mechanism (For Obligated Entities):** Obligated entities that emit less than their assigned targets get **Carbon Credit Certificates**, which can be traded on power exchanges.
 - > Conversely, entities that **fail to meet their targets** will be required to **purchase and surrender** an equivalent number of CCCs to ensure compliance.
 - **Voluntary Offset Mechanism:** Enables **other sectors to register their projects for GHG emission reduction, removal, or avoidance**, in exchange for the issuance of Carbon Credit Certificates.
- **Administrator:** Bureau of Energy Efficiency (BEE)
- **Regulator of Carbon Trading:** Central Electricity Regulatory Commission (CERC)

GHG Emissions in India: 4th Biennial Update Report (BUR-4)

- **Total GHG emissions:** 2,959 million tonnes of CO₂ excluding Land Use Change and Forestry (LULUCF)
- 2,437 million tonnes of CO₂ when LULUCF is included.
- **Historical share of cumulative global GHG emissions:** Annual 4% 1850 and 2019 (17% of world's population)
- **Reduction in GHG emissions:** 7.93% reduction in 2020 compared to 2019
- **Sector wise emissions (decreasing order):** Energy (75.66%); Agriculture (13.72%); Industrial Process & Product Use (IPPU) (8.06%); Waste (2.56%).
- **Emissions by Gases (decreasing order):** Carbon dioxide (80.53%); Methane (13.32%); Nitrous oxide (5.13%); Others (1.02%).

India's other Market Mechanisms for Emissions Reduction

- **Performance Achieve and Trade (PAT) Scheme:** Reduces Specific Energy Consumption (SEC) in energy-intensive industries by issuing **Energy Savings Certificates (ESCert)**.
- **Renewable Energy Certificates (REC):** Trading certificates to help meet **Renewable Purchase Obligation (RPO)**
- **Rate-based Emissions Trading System (ETS):** India's transition towards performance-based emissions trading with CCTS adoption. Focuses on improving emission intensity rather than absolute reductions.

About Carbon Markets

- Carbon markets are **trading systems in which carbon credits** are sold and bought.
 - 1 carbon credit is equivalent to 1 tonne CO₂ (or equivalent GHG) emissions reduced/sequestered/avoided).
- Companies or individuals can use carbon markets to compensate for their GHG emissions by purchasing carbon credits from entities that remove or reduce GHGs.
- They transfer **resources from private sector to State**.

2.2.3. GREEN CREDIT PROGRAM

Why in the News?

The Ministry of Environment, Forests, and Climate Change (MoEFCC) has issued a **new methodology for calculating Green Credit** for tree plantation under the **Green Credit Rules, 2023** enacted under the **Environment (Protection) Act, 1986**.

About Green Credits

- Green Credit means a **singular unit of an incentive provided** for a specified activity, delivering a positive impact on the environment.
 - These credits can be **traded on a dedicated exchange**, similar to how carbon credits are traded.

Note: Green Credits are different from carbon credits granted under the **Carbon Credit Trading Scheme** operating under The Energy Conservation Act, 2001.

Revised Green Credit Calculation Methodology with respect to Tree plantation

- Claim of Green Credit:** After 5 years of restoration on degraded forest land and achieving a minimum 40% canopy density.
- 1 Green Credit = 1 new tree** (over 5 years old).
- Credit Transfer:** Credits are **non-tradable and non-transferable** and may be exchanged once but cannot be reused.

About the Green Credit Program

- It is an innovative **market-based mechanism** to encourage voluntary plantation activity for afforestation and water conservation.
- It is an **initiative within** the Lifestyle for Environment or **LiFE movement**.
 - Mission LiFE (2021)** is an India-led global mass movement to nudge individual and community action to protect and preserve the environment.
- Established under:** The Environment (Protection) Act, 1986
- Nodal Agency:** MoEFCC
- Objectives:**
 - Land Bank Creation:** Through registration of degraded forest lands by Forest departments.
 - Encourage Participation:** Of Government entities, Private companies, NGOs, Individuals/group of individuals (registered under the Societies Registration Act)



2.2.4. ARTICLE 6 OF PARIS CLIMATE AGREEMENT

Why in the news?

The MoEFCC announced the NDA (National Designated Authority) for the implementation of **Article 6** of the Paris Agreement (2015) under **Environment (Protection) Act, 1986**.

About NDA

- Functions of NDA:** Recommend list of eligible activities/projects for emission reduction trading and authorize projects under Article 6.4.
- India's list of identified activities/projects under Article 6.4:** GHG mitigation activities (renewable energy, green hydrogen etc.), Alternate materials (Green Ammonia) and Removal Activities (Carbon Capture, Utilization and Storage).
- Composition:** 21-member committee, headed by Secretary, Environment Ministry.

Article 6 of Paris Agreement

- Article 6 enables countries to meet their climate goals through **voluntary cooperation** by establishing **international carbon compliance markets** for trading **carbon credits**.
- COP29** (Baku, Azerbaijan), **UNFCCC (United Nations Framework Convention on Climate Change)** adopted the final rules for **Article 6.2 (cooperative approaches)** and **Article 6.4 (the Paris Agreement Crediting Mechanism)**.

Mechanisms under Article 6		
 Market based approaches	 Non-Market based approach	
Article 6.2	Article 6.4	Article 6.8
<ul style="list-style-type: none">Decentralized approach for bilateral cooperation.Trading of International Transferred Mitigation outcomes (ITMOs) (emissions reductions that result from mitigation actions).Corresponding adjustment in nationally determined contributions (NDCs) are made on trade of ITMOs.	<ul style="list-style-type: none">Centralized approach termed as Paris Agreement Crediting Mechanism (PACM).Establishes a global carbon market.Uses Baseline-and-crediting mechanism.Successor to the Kyoto Protocol's Clean Development Mechanism (CDM).	<ul style="list-style-type: none">Introduces non-market approaches to promote mitigation and adaptation.No trading of emission reductions is involved.

Difference between Carbon trading of Kyoto Protocol and Paris Agreement

Aspect	Kyoto Protocol	Paris Agreement (Article 6)
Scope of Participation	Limited to developed countries (Annex I) with project hosting by developing countries.	Inclusive of all countries.
Adaptation Funding	Share of proceeds from CDM projects directed to the Adaptation Fund.	5% of proceeds from Article 6.4 transactions allocated to the Global Adaptation Fund .
Market Scope	Focused on project-based mechanisms like Clean Development Mechanism (CDM) and Joint Implementation (JI).	Combines market-based and non-market-based approaches .
Legacy Credits	Allowed use of older credits from inactive projects, causing oversupply concerns.	Restricts legacy credit use; only post-2013 credits.

2.2.5. MONTREAL PROTOCOL

Why in the news?

37th Meeting of the parties to the Montreal Protocol on Substances that Deplete the Ozone Layer (**MOP37**) recently concluded highlighting **discrepancies in reporting of hydrofluorocarbon (HFCs) emissions** etc.

About Montreal Protocol

- **Signed:** 1987 (entered into force in 1989; India ratified in 1992)
- **Global Legally binding treaty** to eliminate production and use of **Ozone depleting Substances (ODS)** like Chlorofluorocarbons (CFCs), Halons, Carbon Tetrachloride, Methyl Chloroform, Hydrobromofluorocarbons (HBFCs) etc.
- Implemented under Vienna Convention (adopted in 1985).
- Kigali Amendment to Montreal Protocol: Adopted in 2016 to phase-down production and consumption of **HFCs** (non-ODS but potent greenhouse gases).
- **Success:**
 - Phase-out of nearly 99% of banned ODS globally.
 - Ozone layer is expected to recover to 1980 values by 2040, if current policies remain in place.
 - Over the Antarctic, recovery is expected by around 2066, and by 2045 over the Arctic.

About HFCs

- Group of synthetic gases primarily used for **cooling and refrigeration**.
- **Very powerful, short-lived climate pollutants** with average atmospheric lifetime of 15 years.
- They warm the planet **3,790 times as much as CO₂ over a 20-year period**.
- They are **non-ODS alternative** to Chlorofluorocarbons (CFCs) and Hydrochlorofluorocarbons (HCFCs).

India's Key Achievements under MP

- Phased out **Chlorofluorocarbons (CFCs), Carbon Tetrachloride (CTC), and halons** for controlled use by 2010, ahead of MP Schedules.
- Enacted **Ozone Depleting Substances (ODS) (Regulation and Control) Rules in 2000**, banning CFCs and halons in new equipment by **2003**.
- Met **2013 Hydrochlorofluorocarbon (HCFC) freeze** and **2015 10% reduction targets under HCFC Phase-out Management Plan (HPMP) Stage-I**, phasing out 341.77 Ozone Depleting Potential (ODP) tonnes.

2.2.6. NET ZERO FRAMEWORK FOR GLOBAL SHIPPING

Why in the News?

International Maritime Organization (IMO) approved the Net-Zero Framework for Global Shipping.

Key Features of the Framework

- It will be included in **Annex VI (Prevention of air pollution from ships)** to the **International Convention for the Prevention of Pollution from Ships (MARPOL)**.
 - MARPOL is the international convention aimed at the **prevention of pollution from ships** caused by operational or accidental causes.
- **Aim: Net-zero** emissions by or around, i.e. close to **2050**.
 - Shipping accounts for almost **3% of global greenhouse gas (GHG) emissions**.
- The Framework is the **first in the world** to combine **mandatory emissions limits** and **GHG pricing** across an entire industry sector.
 - Once into force, it will become **mandatory** for large ocean-going ships **over 5,000 gross tonnage**, which emit **85%** of the total CO₂ emissions from international shipping.
- **Ships will be required to comply with:**
 - **Global Fuel Standard:** Ships must reduce, over time, their annual **greenhouse gas fuel intensity (GFI)**, that is, how much GHG is emitted for each unit of energy used.
 - **Global Economic Measure:** Ships **exceeding** GFI thresholds must **purchase remedial units** and **zero/near-zero GHG technology** users receive **financial rewards**.
- **IMO Net-Zero Fund:** It will be established to collect pricing contributions from emissions.



International Maritime Organization (IMO)



About: UN specialized agency with responsibility for the safety and security of shipping and the prevention of marine and atmospheric pollution by ships.



Genesis: IMO Convention adopted at international conference in Geneva in 1948, came into force in 1958.



Members: 176 (India is a Member)



Maritime Safety Committee (MSC): Highest technical body consisting all Member States.



Key IMO Conventions

- ▷ International Convention for the Safety of Life at Sea (SOLAS), 1974
- ▷ International Convention for the Prevention of Pollution from Ships (MARPOL)
- ▷ The Hong Kong International Convention for the Safe and Environmentally Sound Recycling of Ships, 2009.

2.2.7. CARBON CAPTURE AND UTILISATION (CCU)

Why in the news?

First of its kind R&D Roadmap to Enable India's Net Zero Targets through Carbon Capture, Utilization and Storage (CCUS) prepared by the Department of Science and Technology (DST) was launched recently.

About Carbon Capture and Utilisation (CCU)

- Set of technologies that allow for the capture & use of carbon as a feedstock for making essential products such as fuels, chemicals, etc., which are predominantly derived from fossil resources.
- **Carbon Capture:**
 - From industrial (e.g., cement plants) or energy (e.g., biomass power plants) sources: Technologies like membranes, solvent absorption, or adsorption separate CO₂ from flue gases.
 - Direct Air Capture (DAC): Ambient air is drawn through a gas trapping system where CO₂ is isolated from the rest of the air to be used or stored.
- **Carbon Utilisation:** Once captured, CO₂ can be utilised through two main pathways: Direct Utilisation & CO₂-to-Products

Carbon dioxide Utilization Pathways

Direct Utilisation



Enhanced Oil Recovery (EOR)
CO₂ injected into oil/gas reservoirs to boost extraction.



Food & Healthcare
High-purity CO₂ used in food processing and medical applications.



Industrial Uses
As a solvent (e.g., dry cleaning), heat transfer fluid, welding gas, etc.



Chemicals
Used in urea production, plastics (e.g., polycarbonates), and microbiological conversions.

CO₂-to-Products



Fuels
Converted to methanol or further processed into gasoline and diesel via Fischer-Tropsch synthesis.



Mineral Carbonates
Reacted with calcium/magnesium to produce building materials. E.g., cement.

Relater Concept: Ocean-based CCUS

- It involves **capturing CO₂** from various sources and storing it in **seawater or deep-sea sediments**.
- **Key Techniques**
 - **Ocean Alkalinity Enhancement (OAE)**: Accelerates **CO₂ absorption** by adding **pulverized minerals** (e.g., **Lime**) or electrochemically boosting rock weathering.
 - **Ocean fertilisation**: Promotes **growth of phytoplankton** by adding micronutrients like phosphorus, nitrogen, etc., facilitating deep-ocean carbon storage.
 - **Other: Biological Carbon Capture, Enhancement of Blue Carbon Sinks** like mangroves.

2.2.8. METHANE EMISSIONS

Why in the news?

Global Methane Status Report 2025, released by UNEP with **Climate and Clean Air Coalition (CCAC)**, found that Methane's atmospheric Concentrations has more than doubled since pre-industrial times in 2020.

About CCAC

- **CCAC was founded in 2012, and convened within UNEP**
- It is a **voluntary partnership** of more than 160 governments, intergovernmental organizations, and NGOs.
 - **India joined CCAC in 2019**.
- It works to reduce powerful but **short-lived climate pollutants**– methane, black carbon, hydrofluorocarbons (HFCs), and tropospheric ozone – that drive both climate change and air pollution.

About Methane as a GHG

- Atmospheric methane is **2nd biggest driver of climate change** after carbon dioxide, responsible for about 1/3rd of the planet's warming.
- It is over **80 times more potent than CO₂ over 20 year period** but persists for a **shorter period** (7-12 years).
- **Major Sources:**
 - **60% from human activities** with agriculture, fossil fuels, and landfill waste being the largest contributors.
 - **~40% of emissions from Natural processes**, with wetlands as the largest source.
 - **Other sources**: Glacial fracking.
- India is world's **3rd largest methane emitter** (primarily driven by Stubble burning) after China and the United States.

2.2.9. GLACIER PRESERVATION

Why in the News?

Nepal's Yala Glacier was recently declared dead after it **shrunk by 66%** since the 1970s.

Other major glaciers declared dead

- **Pizol Glacier, Switzerland** (2019); **Clark Glacier, US** (2020); **Ayoloco glacier, Mexico** (2021); etc.
- World's **first funeral was held for Okjokull glacier** in Iceland in 2019.

Consequences of Glacial Loss

- **Reduced Glaciers will have less albedo effect** and therefore will increase heat absorption.
- Melting glaciers have caused **nearly 2 cm to global sea level rise** since 2001.
- **Nearly three-quarters of Earth's freshwater** is stored in glaciers.
- Increases risks of **Glacial Lake Outburst Floods (GLOFs)** and avalanches.

Recent Initiatives for conservation of Glaciers

Global

- **UN Initiatives**
 - 2025 designated as the **International Year of Glaciers' Preservation**.
 - **Decade of Action for Cryospheric Sciences (2025–2034)**
 - March 21 to be observed annually as **World Day for Glaciers**.
- **High-Level International Conference on Glaciers' Preservation** organized in Dushanbe (Tajikistan) in collaboration with UNESCO and World Meteorological Organisation (WMO).

India's Initiatives

- **Ministry of Earth Sciences Initiatives for Himalayan ecosystem**
 - **ICE-CRUNCH (Ice nucleating particles and cloud condensation nuclei properties in the North-Western Himalayas)**: A collaborative study between scientists of India and Switzerland
 - **India's first High-Altitude Climate Research Station**: In Nathatop, Jammu and Kashmir for Climate research, capacity building, training of young scientists, and development of climate modelling capabilities.
 - > It will serve as a long-term research hub affiliated with the World Meteorological Organization's (WMO) **Global Atmospheric Watch (GAW) Programme**.

2.3. OTHER IMPORTANT NEWS

News	Details
Maitri II	<p>Union Finance Ministry granted approval to Maitri II, new research station in Eastern Antarctica.</p> <ul style="list-style-type: none">• This will be India's 4th research base, expected to be operational by January 2029.• It would be established as a green research base powered using renewable energy sources (solar and wind) and would house automated instruments.• India's other Polar research stations: Maitri (Antarctica) Bharati (Antarctica), Dakshin Gangotri (first scientific base station of India situated in Antarctica now decommissioned), and Himadri (Arctic).• Legal framework: Indian Antarctic Act, 2022
Global Reporting Initiative	<p>The Global Reporting Initiative (GRI) launched the Integrity Matters Checklist, a UN-endorsed framework designed to align corporate climate disclosures with the United Nations' net-zero standards.</p> <ul style="list-style-type: none">• An international, non-profit body that sets the world's most widely used sustainability reporting framework.• Established: 1997• GRI Standards enable organizations to report economic, environmental, and social (ESG) impacts and follow a three-part system comprising Universal, Sector, and Topic Standards.
Net-Zero Banking Alliance	<p>It has been dissolved after several member banks withdrew.</p> <ul style="list-style-type: none">• Established in 2021 under UN Environment Programme's Finance Initiative• Aimed at encouraging banks to reduce the carbon footprint of their loans and investments and support transition to a net-zero economy by 2050.
UAE Consensus	<p>A recent UN report highlights the UAE Consensus as a key milestone advancing global clean energy transition.</p> <ul style="list-style-type: none">• Adopted at COP28 (2023), marked the first-ever Global Stocktake under the Paris Agreement.• Urges nations to transition away from fossil fuels in a just, fair, and balanced way.• Sets goals to triple renewable energy and double energy efficiency by 2030.

	<ul style="list-style-type: none">• Reinforces the collective aim to keep 1.5°C within reach and achieve net zero emissions by 2050.
AmazonFACE	<p>Scientists in Brazil have launched the AmazonFACE (Free-Air CO₂ Enrichment) project near Manaus.</p> <ul style="list-style-type: none">• It seeks to simulate the atmosphere of the future and assess how tropical forests adapt to rising CO₂, temperature, and humidity.• It will understand carbon uptake capacity, photosynthesis, and forest resilience with Continuous monitoring (every 10 minutes) of CO₂ absorption.
NASA' Orbiting Carbon Observatory (OCO)	<p>The USA administration plans to shut down NASA's OCO missions which are a key data source for scientists, policymakers, and farmers.</p> <ul style="list-style-type: none">• Launch: OCO-2 satellite launched in 2014 and OCO-3 in 2019 as an Instrument on the International Space Station (ISS).• Key Findings:<ul style="list-style-type: none">○ Amazon rainforest emits more CO₂ than it absorbs.○ Boreal forests in Canada, Russia, and melting permafrost areas absorb more CO₂ than they emit.

2.4. TERMS/CONCEPTS IN NEWS

2.4.1. CLIMATE TIPPING POINT

Warm-water **coral reefs have crossed their thermal tipping point**, triggering **irreversible dieback**.

About climate tipping point

- These are **critical thresholds in a system** that, when exceeded, can lead to a significant change in the state of the system, often with an understanding that the change is irreversible (Intergovernmental Panel on Climate Change (IPCC)).
 - For E.g., Global warming triggers a change like a rainforest becoming a dry savannah.
- **Tipping points are interlinked**, meaning crossing one may accelerate collapse of others, creating a cascading effect threatening planetary stability.
- **Tipping points identified by IPCC:** Amazon rainforest dieback, permafrost collapse, Atlantic Meridional Overturning Circulation (AMOC) slowdown, Boreal Forest shift, Greenland and Antarctic ice sheets collapse risks.

2.4.2. ARCTIC AMPLIFICATION

In February 2025, **exceptionally high air temperatures and rainfall** over Svalbard (an archipelago in the Arctic) triggered widespread snowmelt and pooling of meltwater due to **Arctic Amplification**.

About Arctic Amplification

- A phenomenon where climate in Arctic warms **more quickly than the rest of the Earth**.
- **Factors for Arctic Amplification:** **Reduced Albedo** due to melting of reflective ice (acts as a feedback loop); **Lapse rate feedback** (warming from GHG **most pronounced near the surface** unlike Tropics where extra heat spreads vertically due to convection); **Water Vapour Triple Effect** (creates more **cloud cover**, release **heat** during **condensation** into water, acts as a **greenhouse gas**); **Atmospheric Heat transport from tropics**
- **Impact of Arctic Amplification:** **Accelerates Global Warming due to** Permafrost thawing; **Ecological Change**
- **Impacts on India:** Disruption of Indian Monsoon; Sea level rise etc.

2.4.3. PLANETARY BOUNDARIES

The **Planetary Health Check (PHC) 2025**, released by the **Potsdam Institute for Climate Impact Research (PIK)**, provides a scientific assessment regarding Planetary Boundaries (PBs).

About Planetary Boundaries (PBs)

- PBs are **ecological thresholds** defining the safe limits, or "**safe operating space**," within which humanity can safely exist.
- These are **nine processes** vital for maintaining global stability, resilience, and life-support functions.
- **Status:** **7 of the 9 PBs have been transgressed** except Atmospheric Aerosol Loading & Stratospheric Ozone Depletion and **Ocean Acidification crossed its safe operating space for the first time.**



Nine Planetary Boundaries include

Climate change	Change in Biosphere Integrity	Land System Change
Freshwater Change	Modification of Biogeochemical Flows	Introduction of Novel Entities
Ocean Acidification	Increase in Atmospheric Aerosol Loading	Stratospheric Ozone Depletion

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2.5. ORGANIZATIONS IN NEWS

2.5.1. UNITED NATIONS ENVIRONMENT PROGRAMME (UNEP)

United Nations Environment Programme



Nairobi, Kenya

 **Genesis:** 1972, following UN Conference on Human Environment.

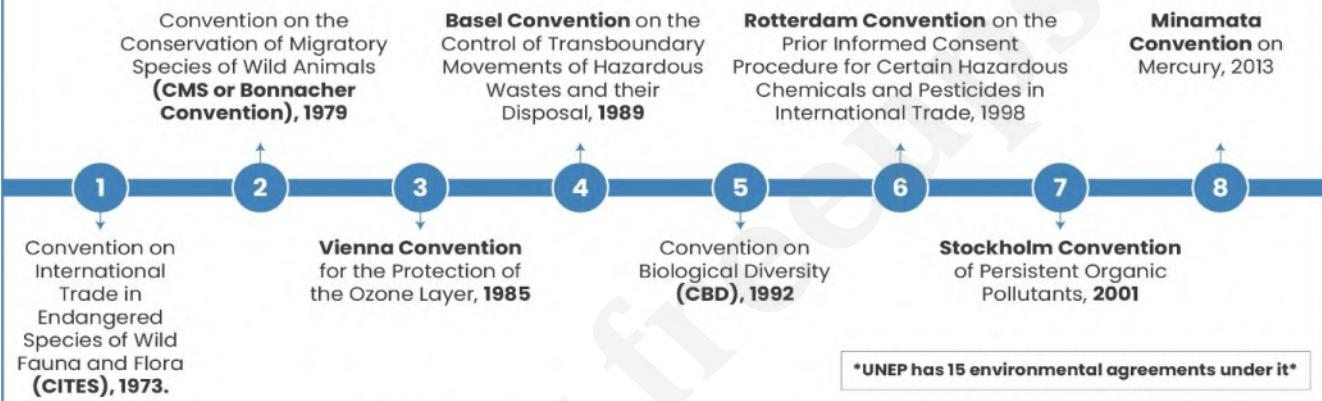
 **Members:** 193 UN Members (Including India).

 **Funding:** Relies on voluntary contributions for over 95% of funding needs.
▷ Environment Fund is UNEP's core fund.

▶ **Hosts the secretariats of various conventions (see infographic) and Entities:**
▷ Intergovernmental Science-Policy Platform on Biodiversity and Ecosystem Services (IPBES).
▷ Intergovernmental Panel on Climate Change (IPCC)- Jointly by UNEP and World Meteorological Organization (WMO).

▶ **Common Carbon Metric:** Supported by UNEP developed for assessing the carbon footprint of building operations around the world.

Major Global Multilateral Agreements under UNEP



The timeline shows the following agreements:

- 1. Convention on International Trade in Endangered Species of Wild Fauna and Flora (CITES), 1973.
- 2. Convention on the Conservation of Migratory Species of Wild Animals (CMS or Bonnacher Convention), 1979.
- 3. Vienna Convention for the Protection of the Ozone Layer, 1985.
- 4. Basel Convention on the Control of Transboundary Movements of Hazardous Wastes and their Disposal, 1989.
- 5. Convention on Biological Diversity (CBD), 1992.
- 6. Stockholm Convention of Persistent Organic Pollutants, 2001.
- 7. Rotterdam Convention on the Prior Informed Consent Procedure for Certain Hazardous Chemicals and Pesticides in International Trade, 1998.
- 8. Minamata Convention on Mercury, 2013.

UNEP has 15 environmental agreements under it

Reports	Key Findings
State of Finance for Forests 2025	<ul style="list-style-type: none">First such report, Theme- 'Unlock. Unleash. Realizing forest potential requires tripling investments in forests by 2030'
Other Reports	<ul style="list-style-type: none">Emission Gap Report, 2025Adaptation Gap Report 2025Global Environment Outlook 7 "A Future We Choose"An Eye on Methane: From measurement to momentum by UNEP's International Methane Emissions Observatory (IMEO)Global Cooling Watch 2025 (under Cool Coalition)Frontiers 2025: The Weight of Time ReportSpreading Like Wildfire

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2.5.2. GLOBAL ENVIRONMENT FACILITY



global
environment
facility
INVESTING IN OUR PLANET

Global Environment Facility

Washington,
D.C., USA



About: International financial mechanism to **help developing countries** address complex challenges and work towards meeting international environmental goals.

- ▷ **World's largest multilateral fund** for environment.
- ▷ **1st Assembly** of GEF took place in **India in 1998**.



Genesis: **Established in 1992** during the **Rio Earth Summit**

- ▶ Acts as **financial mechanism for 5 major international environmental conventions:**
 - ▷ United Nations Framework Convention on Climate Change (UNFCCC)
 - ▷ United Nations Convention on Biological Diversity (UNCBD)
 - ▷ United Nations Convention to Combat Desertification (UNCCD)
 - ▷ Minamata Convention on Mercury
 - ▷ Stockholm Convention on Persistent Organic Pollutants (POPs)



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2.5.3. WORLD METEOROLOGICAL ORGANISATION (WMO)



World Meteorological Organisation



About: Provides the framework for **international cooperation** to advance meteorological, climatological, hydrological, and related environmental services, to improve well-being of all.



Genesis: Established **in 1950** as a specialized agency of the United Nations.



Member: 193 Member States including **India**



Initiative

- ▶ Indian Navy Hosted **Meghayan-25** Symposium to commemorate World Meteorological Organisation (WMO) formation and WMO Day 2025.

- ▶ **Global Atmosphere Watch (GAW) Programme:** Coordinates global atmospheric monitoring networks.

Reports	Key Findings
Greenhouse Gas Bulletin	<ul style="list-style-type: none"> ▶ Record CO2 Levels: Atmospheric CO2 reached 423.9 ppm in 2024, up 3.5 ppm from 2023 (largest annual increase since records began in 1957). ▶ Warmest Year on Record: 2024, with global temperatures 1.55°C above pre-industrial levels. ▶ Radiative forcing: Long-lived greenhouse gases increased by 54%. ▶ Radiative forcing allows for approximate comparison of climatic effects of various changes to planet. ▶ Large radiative forcing indicates proportionate change in global mean temperature.
Other Reports	<ul style="list-style-type: none"> ▶ State of the Global Climate ▶ State of the Climate in Asia 2024 ▶ State of Global Water Resources 2024 ▶ Air Quality and Climate Bulletin ▶ Global Annual to Decadal Climate Update (2025–2029) ▶ WMO Airborne Dust Bulletin ▶ WMO Ozone and UV Bulletin ▶ Global Status of Multi-Hazard Early Warning Systems

2.6. RELATED REPORTS/INDICES IN NEWS

Report/Indices	Detail	
State and Trends of Carbon Pricing 2025	<ul style="list-style-type: none"> • Released by: World Bank Group. • Carbon pricing is an environmental policy tool that puts a financial cost on greenhouse gas (GHG) emissions (usually measured in per ton of CO₂ equivalent, or tCO₂e). 	<p>Carbon Pricing and its Instruments</p> <p> Emissions Trading Systems: Government sets a cap on GHG emissions or emission intensity for covered entities.</p> <p> Carbon Taxes: Government levies a fee on covered entities for their GHG emissions.</p> <p> Carbon Crediting Mechanisms: Tradable credits are generated through voluntary activities that reduce emissions.</p>

	<ul style="list-style-type: none"> Sector Wise Coverage: Power followed by industry sector have highest coverage.
State of the Cryosphere Report 2025	<ul style="list-style-type: none"> Released by: International Cryosphere Climate Initiative
Energy Transition Index (ETI), 2025	<ul style="list-style-type: none"> Released by: World Economic Forum (WEF) Ranks countries on their progress towards energy transition from fossil fuels to clean energy. Sweden ranked first followed by Finland, Denmark and Norway India's rank dropped from rank 63 in 2024 to rank 71 in 2025. Takes into account two main aspects: <ul style="list-style-type: none"> System Performance (energy security, equity & sustainability) Transition Readiness (regulation, infrastructure, investment etc.)
Climate Risk Index (CRI) 2026	<ul style="list-style-type: none"> Published by: Germanwatch Ranks countries based on human and economic toll of extreme weather events. Introduced in 2006 as an annual global climate impact index. India ranked 15th in CRI 2024 and 9th in CRI for 1995-2024.
Climate Change Performance Index (CCPI) 2026	<ul style="list-style-type: none"> Published by: Germanwatch, New Climate Institute & Climate Action Network (CAN). Compares climate performance of 63 countries and the EU, which together account for over 90% of global GHG emissions. None of the countries are in the top 3. Denmark is 4th, followed by UK & Morocco. India ranks 23rd, going from a high performer to a medium one in this year's CCPI. Measures performance in 4 categories of GHG Emissions, Renewable Energy, Energy Use and Climate Policy.



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3. POLLUTION

3.1. INTERNATIONAL CONVENTIONS/TREATIES

3.1.1. 2025 CONFERENCES OF PARTIES TO BASEL, ROTTERDAM, AND STOCKHOLM CONVENTIONS

Why in the news?

The 17th Basel, 12th Rotterdam, and 12th Stockholm Convention meetings were held in **Geneva**.

Key Outcomes of the Three COPs:

- **Joint Commitment:** Enhanced collaboration with other environmental agreements/initiatives.
- **Basel Convention (BC COP-17):**
 - Updated **technical guidelines** for managing persistent organic pollutants (POPs).
 - Adopted a **new strategic framework (2025–2031)**.
 - Launched work on **transboundary movements of textile waste**.
- **Rotterdam Convention (RC COP-12):**
 - Added **2 chemicals to Annex III: Carbosulfan (pesticide) and Fenthion**.
 - Adopted **2026–2027** Compliance Committee work programme.
- **Stockholm Convention (SC COP-12):**
 - Addition to **Annex A: Chlorpyrifos (pesticide)**, and 2 groups of industrial chemicals- **Long-chain perfluorocarboxylic acids (LC-PFCAs), Medium-chain chlorinated paraffins (MCCPs)**.
 - **Listing of UV-328** amended with new specific exemption (water-seal tape, adhesives and coatings in aircraft etc.)
 - > **UV-328** belongs to a group of phenolic benzotriazoles (BZTs) commonly used as a UV stabilizer in plastics, coatings, paints, and other industrial materials.

Basel Convention on Control of Transboundary Movements of Hazardous Wastes and their Disposal <ul style="list-style-type: none">• Adopted on 22 March 1989 in Basel, Switzerland. (India is a party).• Scope: Broad range of hazardous wastes, identified by their origin, composition, or characteristics.<ul style="list-style-type: none">○ Also includes four categories of "other wastes" like household, certain plastic, etc.• Transboundary Waste Control: Enforces Prior Informed Consent (PIC) procedure.• New Focus Area: Textile Waste, Shipbreaking (Overlaps with Hong Kong Convention).• Exclusion: Radioactive waste and waste from normal operations of a ship, covered by another international instruments.	Rotterdam Convention on Prior Informed Consent Procedures (PIC) for certain hazardous chemicals and pesticides in international trade <ul style="list-style-type: none">• Enforced in 2004.<ul style="list-style-type: none">○ India acceded in 2006.○ Has 4 annexures, with 3rd annexure having list of banned chemicals and pesticides.• Objective: Promotes shared responsibility and cooperative efforts among Parties in international trade of certain hazardous chemicals.• Covers: Banned or severely restricted Pesticides and Industrial chemicals.• Procedure: Creates legally binding obligations.<ul style="list-style-type: none">○ Doesn't ban chemicals but promotes informed decisions.
Stockholm Convention on Persistent Organic Pollutants (POPs) <ul style="list-style-type: none">• Genesis: Adopted in 2001 in Stockholm, Sweden; Enforced in 2004. Ratified by India in 2006.• Objective: Protect health & environment from lasting chemicals accumulating in humans and wildlife.	

3.1.2. MINAMATA CONVENTION

Why in the news?

COP-6 to the **Minamata Convention on Mercury** (COP-6) was recently held in **Geneva**.

Key outcomes

- Signatory nations agreed to **phase out mercury-based dental amalgams by 2034**.
- Agreed to step up global efforts to eliminate **mercury-added skin-lightening products**.
- Strengthened action on **artisanal and small-scale gold mining (ASGM)**



Minamata Convention on Mercury

Legally binding treaty signed in 2013, effective 2017, to protect from mercury.

Origin: Named after Minamata Bay, Japan, site of severe mercury poisoning.

Members: 153 parties (India is a member).

Secretariat: UNEP provides secretariat support, aiding implementation and compliance.

About Mercury (Hg)

- A naturally occurring (weathering of rocks, volcanic eruptions etc.), heavy, silvery-white transition metal and the only common metal that is liquid at room temperature.
 - **Other sources:** Coal ash, Coal-based thermal power plants, gold mining etc.
- **Usage:** Historically used in thermometers, barometers, fluorescent lighting, certain batteries, and dental amalgams.
- **Toxicity:** Mercury emitted can convert into highly toxic methylmercury that builds up in fish, shellfish and animals that eat fish (bioaccumulation).
 - Mercury exposure **can be highly toxic**, affecting the nervous system, kidneys, skin, eyes, digestive system and immune system.
 - There is **no known safe level** of mercury exposure for humans.

3.1.3. GLOBAL PLASTIC POLLUTION TREATY

Why in the news?

Intergovernmental Negotiating Committee talks to develop **Global Plastic pollution treaty adjourned**.

About Global Plastic Pollution Treaty

- **UNEA Resolution:** Adopted in 2022 entitled "**End plastic pollution: towards an international legally binding instrument**" tasked INC to develop an **international legally binding instrument on plastic pollution**, including marine environment.
- **Approach:** Both **binding and voluntary**.
- **Disagreements:** **Like Minded Countries** like Saudi Arabia, Iran, Kuwait, Bahrain, China, Cuba, and **India**, **rejected restrictions on production**.
 - However, **High Ambition Coalition (HAC)** of around 100 countries, including European Union, argued production caps as essential.

Evolution of Global Plastic Pollution Treaty

- 1988 - MARPOL Annex V by IMO
First treaty banning plastics in ship-based discharges (158 parties).
↓
- 2012 - RIO+20 Declaration
Recognized marine plastic pollution as global concern.
↓
- 2015 - SDGs (Agenda 2030)
SDG 12 & 14.1: Reduce waste, promote sustainable consumption, curb marine plastic pollution.
↓
- 2019 - Basel Convention Amendments
Brought plastic waste under global notification & prior informed consent rules.
↓
- 2020s - Trade & Plastic Pollution
UNCTAD/WTO call for policy to promote plastic substitutes, databases, and WTO informal dialogue on plastic pollution.
↓
- 2022-2025 - Intergovernmental Negotiating Committee (INC)
Under UNEA resolution, mandated to negotiate treaty addressing plastic lifecycle (production to disposal).

About Plastic Pollution

- **Tyes:** Microplastic (up to **5 millimetres in diameter**); Nanoplastics (**less than 1,000 nanometers**)
- **Extent:** **>460 million metric tons of plastic produced every single year**, of which estimated **20 million** end up polluting the environment. (World Economic Forum)
 - Only **9%** gets recycled.
 - More than **90% of plastics on ocean surface are microplastics.**
- **Source:** Bottles, caps, cigarettes, shopping bags, cups, straws, Eyeglass lenses, Car tyres, **paint shed** from shipping, **discarded fishing gear**, etc.

About Microplastics

- **Characteristics:** **Persistent & highly mobile**, difficult to remove; **Large Surface Area to Volume Ratio** allowing them to adsorb more contaminants and become prone to fouling; **Accumulate in water bodies over time.**
- **Types of Microplastics:**
 - **Primary Microplastics:** Intentionally manufactured. E.g. **Plastic pellets** (used in manufacturing), **Microbeads** (e.g., toothpaste, face wash, cosmetics) etc.
 - **Secondary Microplastics:** From breakdown of larger plastic items. E.g. **Microfibers**, made of **synthetic fibres** like polyester or nylon.
- **Impact:** **Human Health** (Detected in human blood, lungs, placenta); **Food chain and soil contamination, reduces plants' photosynthetic ability** by around 12%; impacts marine life causing **biomagnification, etc.**

India's initiatives to control Plastic Pollution

- **Solid Waste Management Rules, 2016:** Duty on manufacturers for disposal of plastic waste.
- **Plastic Waste Management (PWM) Rules, 2016:** Segregation, recycling, Extended Producer Responsibility, etc. Placed ban on identified **single use plastic items** (2022).
- **PWM (Amendment) Rules, 2021:** Raised thickness limit (**50 microns to 75 microns starting September 30, 2021**, and then to **120 microns from December 31, 2022**) for carry bags.
- **Mandatory Jute Packaging Act, 2010:** Alternative to **plastic packaging**.
- **National Plastic Waste Reporting Portal** for Nationwide Data Access
- **Others:** National Dashboard on Elimination of Single Use Plastics, National Circular Economy Framework (2024) by CII, etc.

3.1.3.1. RELATED TERMS IN NEWS

Term	Detail
Bacteria Ideonella sakaiensis	<ul style="list-style-type: none">● Plastic eating bacteria that can degrade PET (Polyethylene Terephthalate), used in bottles and food packaging.
Polyethylene terephthalate (PET)	<ul style="list-style-type: none">● Used in beverage bottles and food containers and among most common polymers in plant tissues.
Polystyrene (PS)	<ul style="list-style-type: none">● Used in disposable cutlery, cups, etc. and among most common polymers in plant tissues.
Polybutylene Adipate Terephthalate (PBAT)	<ul style="list-style-type: none">● Biodegradable, chemical-free thermoplastic copolymer made from renewable resources, like corn starch and sugarcane.<ul style="list-style-type: none">○ Thermoplastics are polymers that can be softened through heating before being processed and then left to cool and harden.
Pthalates	<ul style="list-style-type: none">● Ortho-phthalates, or “phthalates,” are chemicals used in plastic products (commonly in specific type of plastic named polyvinyl chloride) to make the material soft and less brittle.● Colorless, odorless, oily liquids, also referred to as “plasticizers”.

- | | |
|--|---|
| | <ul style="list-style-type: none">• Do not permanently bind to plastic surfaces to which they are applied.• Toxicity: Categorized as hazardous endocrine-disrupting chemicals (EDCs); affect reproductive health.• Applications: Pharmaceuticals, and medical devices (e.g., medical tubing), Food packaging, etc. |
|--|---|

3.2. AIR POLLUTION

3.2.1. URBAN AIR POLLUTION

Why in the News?

Commission for Air Quality Management (CAQM) has implemented Graded Response Action Plan (GRAP) across the entire NCR highlighting the issue of urban air pollution in India.

About Graded Response Action Plan (GRAP)

- Emergency response mechanism based on **AQI level of Delhi** implemented by CAQM.
- First created on **Supreme Court directions** (M. C. Mehta vs. Union of India).
- It has 4 stages, based on AQI levels-
 - **Stage 1:** Poor category (AQI 201 to 300).
 - **Stage 2:** Very poor category (AQI 301-400).
 - **Stage 3:** Severe category (AQI 401-450).
 - **Stage 4:** Severe + category (AQI 451+)

Air Pollution in India

- **Extent of Air pollution in India (IQAir World Air Quality Report 2024-25)**
 - **World's 5th most polluted country**
 - **13 of world's 20 most polluted cities** are in India.
 - **Bynihat** (Assam-Meghalaya border) is world's most polluted city.
 - **Delhi is the world's most polluted national capital** for the 6th consecutive year.
 - > 10 times annual PM2.5 levels prescribed by WHO guidelines recorded in ~35% of Indian cities.
- **Causes:** Winter weather conditions like temperature inversion; Narrow streets with tall buildings (street-canyon effect) trapping pollutants; Transboundary pollution; Shrinking green/blue spaces reduces natural filtration; lower standards of National Ambient Air Quality Standards (NAAQS) when compared to WHO guidelines (see table) etc.
- **Impact:** Cardiovascular disease, respiratory infections, irritation in eyes etc.; Black carbon, ground-level ozone contribute to global warming; Acid Rain.

Pollutant	WHO 2021 Guideline	India (NAAQS)
PM2.5	5 µg/m³	40 µg/m³
PM10	15 µg/m³	60 µg/m³
NO₂	10 µg/m³	40 µg/m³

Steps taken to curb Air Pollution

- **Vehicular Emission Control**
 - **Leapfrogging to BS-VI fuel** and vehicle standards (2020 nationwide).
 - **Transition to 20% Ethanol Blended Petrol (E-20)**
 - Promotion of electric mobility under **PM E-DRIVE Scheme**, Electric Mobility Promotion Scheme 2024 (**EMPS 2024**).
 - **SATAT** initiative for creating Compressed Bio-Gas (CBG) ecosystem.
- **Air Quality Monitoring & Data Systems**
 - **National Air Quality Index (AQI), 2015** (see infographic).
 - System of Air Quality and Weather Forecasting and Research (**SAFAR**) Portal
- **Cloud Seeding:** Delhi government approved **5 cloud-seeding trials**, implemented by IIT Kanpur to combat air pollution.

<ul style="list-style-type: none"> ○ Scientific weather modification technique involving dispersing agents like silver iodide into moisture-bearing clouds to induce precipitation. ○ Conducted on existing natural clouds and does not create clouds. ○ Seeding Agents: Silver Iodide (AgI), most common material, known for its efficient ice nucleating properties. ○ Other chemicals used are potassium iodide (KI), sulfur dioxide (SO₂), frozen carbon dioxide – dry ice (CO₂), etc. 	<p style="text-align: center;">National Air Quality Index</p> <table border="1" style="width: 100%; border-collapse: collapse;"> <thead> <tr> <th style="background-color: #e6f2ff;">AQI Category</th><th style="background-color: #e6f2ff;">AQI Range</th><th style="background-color: #e6f2ff;">Possible Health Impacts</th></tr> </thead> <tbody> <tr> <td style="background-color: #c2e0c2;">Good</td><td style="background-color: #c2e0c2;">0-50</td><td style="background-color: #c2e0c2;">Minimal impact</td></tr> <tr> <td style="background-color: #ffd700;">Satisfactory</td><td style="background-color: #ffd700;">51-100</td><td style="background-color: #ffd700;">Minor breathing discomfort</td></tr> <tr> <td style="background-color: #ffd14b;">Moderate</td><td style="background-color: #ffd14b;">101-200</td><td style="background-color: #ffd14b;">Breathing discomfort to people with lung/heart disease, children and older adults</td></tr> <tr> <td style="background-color: #ff9966;">Poor</td><td style="background-color: #ff9966;">201-300</td><td style="background-color: #ff9966;">Breathing discomfort to people</td></tr> <tr> <td style="background-color: #cc3333;">Very Poor</td><td style="background-color: #cc3333;">300-400</td><td style="background-color: #cc3333;">Respiratory illness on prolonged exposure</td></tr> <tr> <td style="background-color: #990033;">Severe</td><td style="background-color: #990033;">>400</td><td style="background-color: #990033;"></td></tr> </tbody> </table> <p style="text-align: center;">Monitored Pollutants: PM10, PM2.5, NO₂, SO₂, CO, O₃, NH₃, Pb</p>	AQI Category	AQI Range	Possible Health Impacts	Good	0-50	Minimal impact	Satisfactory	51-100	Minor breathing discomfort	Moderate	101-200	Breathing discomfort to people with lung/heart disease, children and older adults	Poor	201-300	Breathing discomfort to people	Very Poor	300-400	Respiratory illness on prolonged exposure	Severe	>400	
AQI Category	AQI Range	Possible Health Impacts																				
Good	0-50	Minimal impact																				
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Poor	201-300	Breathing discomfort to people																				
Very Poor	300-400	Respiratory illness on prolonged exposure																				
Severe	>400																					



Commission for Air Quality Management in NCR and Adjoining Areas (CAQM)



Genesis: Statutory body under **Commission for Air Quality Management in National Capital Region and Adjoining Areas Act 2021**.



Nodal Ministry: Ministry of Environment, Forest and Climate Change.



Role & Powers: To take all such measures, issue directions, etc, for protecting and improving air quality in **National Capital Region and Adjoining Areas (Haryana, Punjab, Rajasthan and Uttar Pradesh)**

▷ Its orders **override** those of state governments, CPCB, state PCBs, and others in case of conflict.



Chairperson: Must have experience either:

▷ At least 15 years in **environment protection/pollution control**, or

▷ At least 25 years in **administration**

3.2.2. SWACHH VAYU SARVESHAN AWARD 2025

Why in the news?

Awards were announced by **Ministry of Environment, Forest and Climate Change**, recognizing best-performing cities, conducted across 130 cities under **National Clean Air Programme (NCAP)**.

Swachh Vayu Sarveshan Award 2025

- **Population based Categories:** Category 1 (Population >10 lakh), Category 2 (Population 3–10 lakh) and Category 3 (Population <3 lakh).
- **Total Awards: 11 best-performing cities** awarded out of 130 NCAP cities.
 - **Category 1 (Population >10 lakh): Indore** (1st Rank) **Jabalpur > Agra & Surat**.
 - **Category 2 (Population 3–10 lakh): Amravati** (1st Rank) >Jhansi & Moradabad> Alwar.
 - **Category 3 (Population <3 lakh): Dewas** (1st Rank)> Parwanoo >Angul.
- **Ranking criteria:** Biomass & Municipal Solid Waste Burning, Road dust, Dust from Construction & Demolition Waste, Vehicular Emissions, Emissions from Industries, etc.

About NCAP

- **Genesis:** Union Ministry of Environment, Forest and Climate Change in 2019.

- **Objective:** Improve air quality in 131 cities (non-attainment and Million Plus Cities) in 24 States/UTs.
- **Target:** Achieve reduction in PM10 level up to 40% or achievement of national ambient air quality standards ($60 \mu\text{g}/\text{m}^3$) by 2025-26 from levels of 2019-20.
- **Implementing Body:** Central Pollution Control Board (CPCB) at national level.
- **PRANA (Portal for Regulation of Air-pollution in non-attainment cities):** Monitors implementation.

3.2.3. AEROSOL

Why in the News?

Scientists attributed "solar dimming" or declining Sunshine Hours (SSH) over last thirty years to higher anthropogenic aerosol emissions.

Aerosol and its types

- **Tiny solid or liquid particles** suspended in the atmosphere (gas medium).
- **Types:**
 - **Primary Aerosols:** Directly emitted particles e.g. sea spray, dust, smoke, and volcanic ash.
 - **Secondary Aerosols:** Formed from gases through chemical reactions, e.g., sulfates from industrial emissions or biomass burning.
- **Impact of Aerosol:**
 - Act as condensation nuclei, causing cloud droplets to be smaller and longer-lived, resulting skies to remain overcast for extended periods.
 - Influences climate and weather including heating, cooling, cloud formation due to absorption or scattering of sunlight.
 - Dust delivers nutrients impacting ecosystem like Amazon rainforest fertilization, etc.
 - Associated with Twomey Effect: Describes how increased anthropogenic aerosol emissions make clouds brighter by creating more tiny droplets, which reflect more sunlight and cool climate.

Related News: Urban Wind Stilling Effect

A study has found that **Urban Wind Stilling Effect** creates **Urban Aerosol Clean Islands** in North India.

About Urban Wind Stilling Effect

- Caused by weakened surface winds due to **urban structures**, creating invisible barriers that slow long-range dust and pollutant entry.
- **Urban Aerosol Clean Islands:** 43% cities in northwest and northern **Indo-Gangetic Plain** had lower aerosol levels than nearby **rural** areas as the city infrastructure blocked aerosol pollution flowing with the winds.

3.3. WATER POLLUTION/CONSERVATION

3.3.1. POLLUTED RIVER STRETCH

Why in the News?

Central Pollution Control Board (CPCB) released assessment report on "**Polluted River Stretches for Restoration of Water Quality - 2025**".

Role of CPCB in monitoring Polluted River stretches

- CPCB executes **National Water Quality Monitoring Programme (NWMP)** with State Pollution Control Boards/Pollution Control Committees.
- CPCB initiated the exercise of identifying country's **Polluted River Stretches (PRS)** since 2009.

About Polluted River Stretch (PRS)

- **PRS:** Two or more polluted locations on a river in a continuous sequence are considered as stretch and identified as PRS.
- **Criteria:** Biochemical Oxygen Demand (BOD) exceeds 3 milligrams/litre (mg/L).
 - BOD is an indicator of water quality, measuring oxygen needed to break down organic matter.
- **Categories:** Five Priority Classes (I to V) based on maximum BOD observed.
 - E.g. **Priority Class I:** Monitoring locations exceeding BOD concentration 30.1 mg/L.
- **Polluted Stretches:** 296 river stretches were polluted on 271 rivers (of 645 rivers assessed) across 32 States/UTs.
- **Total number of PRS has decreased** from 351 (in 2018) to 296 (in 2025).
- **Geographic Distribution:** Maharashtra has highest number (54) of PRS.
- **Notable PRS:** Includes Yamuna in Delhi, Sabarmati in Ahmedabad, Chambal in Madhya Pradesh, Tungabhadra in Karnataka, and Sarabanga in Tamil Nadu.



Central Pollution Control Board (CPCB)



Genesis: Statutory body under Water (Prevention and Control of Pollution) Act, 1974.
▷ Entrusted with powers and functions under Air (Prevention and Control of Pollution) Act, 1981.

Ministry: Ministry of Environment, Forest & Climate Change

Key Functions: Promote cleanliness of streams and wells, control and abatement of water pollution, provide technical services to Environment Ministry under Environment (Protection) Act, 1986.

Key Programmes/initiatives: National Air Quality Monitoring Programme (NAMP); Water Quality Assessment under National Water Quality Monitoring Programme (NWMP), etc.

State Pollution Control Boards (SPCBs): Constituted under same acts to supplement CPCB to implement Environmental Laws and rules within the jurisdiction of a state.

Power to impose Environmental Compensation (EC): As per Supreme Court ruling, PCBs can impose or collect EC under Water Act, 1974 and Air Act, 1981 in case of environmental damage by erring entity or when damage is imminent, not for every violation.
▷ It is distinct from punitive action under the Acts.

Framework for rejuvenation of Rivers

- **Legal Framework:**
 - **Water (Prevention and Control of Pollution) Act, 1974:** Establishes CPCB (central unit) and SPCB (state unit) for planning and regulating environmental matters.
 - **Environment Protection Act, 1986,** lays down standards for industrial discharge.
 - **Waste Management Rules:** Notified on solid waste, biomedical waste, E-waste, etc.
- **River Rejuvenation Programmes:**
 - **Namami Gange Programme:** Superseded Ganga Action Plan (GAP) – launched in 1985 implemented by National Mission for Clean Ganga (NMCG) with River basin as the unit of planning and management
 - > **NMCG:** Registered as a society in 2011 under Societies Registration Act, 1860, acts as the implementation arm of National Ganga River Basin Authority (NGRBA).
 - ✓ Consists two tier management structure and comprises Governing Council and Executive Committee, both headed by Director General, NMCG.
 - > **NGRBA:** Constituted under EPA, 1986 replacing National Ganga Council (chaired by PM) in 2016.
 - **Yamuna Action Plan:** Launched in 1993.

- **Centrally Sponsored Scheme of National River Conservation Plan (NRCP):** In identified stretches of rivers, excluding in Ganga basin.
- **National Water Quality Monitoring Programme (NWQM).**
- **Schemes for Sewerage Infrastructure:** Atal Mission for Rejuvenation & Urban Transformation (AMRUT), Smart Cities Mission, and Swachh Bharat Mission.

3.3.2. DESALINATION TECHNOLOGIES

Why in the News?

Recently, IIT Bombay Scientists develop Lotus leaf-like Solar Evaporators for Salt-water Treatment, through a new **hydrophobic Graphene-based material that can facilitate water desalination.**

Desalination Technologies and Processes

Technologies	Thermal Technology	Membrane Technology
Concept	<ul style="list-style-type: none">● Heating of saline water and collecting condensed vapor (distillate) to produce pure water.● Usage: Mainly seawater desalination.	<ul style="list-style-type: none">● Feedwater is pumped through semi-permeable membranes to filter out dissolved solids.● Usage: Brackish water desalination.
Sub-categories (Processes)	Three groups: <ul style="list-style-type: none">● Multi-Stage Flash Distillation● Multi-Effect Distillation● Vapor Compression Distillation	Two groups: <ul style="list-style-type: none">● Electrodialysis/Electrodialysis Reversal (ED/EDR)● Reverse Osmosis (RO)
Merit	<ul style="list-style-type: none">● Reduce maximum salinity concentration.● Demands less input electrical energy.	<ul style="list-style-type: none">● Environmental Friendly● Require less space.
Demerits	<ul style="list-style-type: none">● Using conventional energy sources like coal.● High costs involved.● Subject to corrosion.	<ul style="list-style-type: none">● Susceptible to Fouling.● Regular Maintenance● Challenges in Membrane Waste Disposal.● May not fully remove Total dissolved solids (TDS) or pathogens.
Example	Low Temperature Thermal Desalination (LTTD) plants in Kavaratti, Minicoy and Agatti Islands in Lakshadweep.	Nemmeli Seawater Desalination Plant, Tamil Nadu.

3.4. MISCELLANEOUS

3.4.1. REVISED CLASSIFICATION OF INDUSTRIES

Why in the News?

Central Pollution Control Board (CPCB) directed State Pollution Control Boards (SPCBs) to adopt revised classification of industries.

About Revised Classification

- **Sectors classified into Red, Orange, Green, White and new Blue category (see table).**

- Revised methodology followed based on **Pollution Index (PI)**- ranges from 0 to 100 with increasing value indicating increased degree of pollution load.
 - PI is determined based on **Precautionary Principle**, i.e., evaluating potential of water pollution, air pollution and hazardous waste generation from a particular sector.
 - It was formulated in 2016 to harmonize criteria for classification of Industries by **assigning equal weightage to scores arising due to Water, Air and Hazardous waste**.
- CPCB to incentivize industries that demonstrated successful implementation of environmental management measures.
 - E.g., Consent to Operate (CTO) for Red Category may be granted for validity of max. 10 years.

Existing Categories of Sectors	
Category	Key detail /Examples
 Red (PI > 80)	<ul style="list-style-type: none">▶ No Red category industries shall normally be permitted in ecologically fragile area/protected area.▶ E.g., Cement, manufacturing of automobiles, distilleries, CBG plants based on industrial or process waste etc.
 Orange (55 ≤ PI < 80)	<ul style="list-style-type: none">▶ E.g., Brick manufacturing, dry cell battery, coal washeries, etc.
 Green (25 ≤ PI < 55)	<ul style="list-style-type: none">▶ E.g., Manufacturing Compact disc (CD/DVD), chilling plants, etc.
 White (PI < 25)	<ul style="list-style-type: none">▶ Non-polluting; do not require Environmental Clearance (EC) and Consent.▶ E.g., Assembly of air coolers, cardboard manufacturing, medical oxygen, etc.
 Blue (based on CPCB formula)	<ul style="list-style-type: none">▶ Includes Essential Environmental Services (ESSs) for management of waste generated from domestic/household activities, essential to control, abate, and mitigate pollution generated from them.▶ E.g., Municipal Solid Waste Management Facility (Sanitary landfill/ Integrated Sanitary landfills, etc.), sewage treatment plants, Compressed Biogas Plants (CBP) based on various feedstock like municipal solid waste, agro-residue, etc.

Note: For any new or left-out sector, SPCB/Pollution Control Committees (PCCs) are allowed to categorize the sector at its own level.

Classification of Industries

- **Background:** Originated in 1989 with **Doon Valley (Uttarakhand) Notification** issued by **Union Ministry of Environment, Forest and Climate Change (MoEFCC)**.
 - **Classification** based on PI was introduced in 2016.
 - Classification is for **entire industrial sectors, not for individual units**.

3.4.2. NEW RULES FOR CONTAMINATED SITE MANAGEMENT

Why in the News?

MoEFCC notified **Environment Protection (Management of Contaminated Sites) Rules, 2025**.

Key highlights

- **Contaminants Covered:** Hazardous substances under Hazardous and Other Wastes (Management and Transboundary Movement) Rules, 2016.
- **Exclusions:** Contamination from **radioactive waste, mining, oil spills at sea, and solid waste dumps** (governed by separate legislation).

- **Response levels:** Different levels for agricultural, residential, commercial, and industrial areas.
- **Contaminated Site Management:** Areas where hazardous waste has been previously disposed of, polluting it and posing health and environmental risks.
 - **Site Identification:** Local bodies/District Administrations to report suspected sites twice a year to SPCBs.
 - **Site Assessment:** State Pollution Control Board (SPCB) to inspect suspected sites and inform CPCB on centralised online portal.
 - **Polluter Identification:** SPCBs identify the polluter. If land is sold, the new owner is liable.
 - **Clean-Up Plan:** Polluter must carry out a clean-up plan through an approved agency, and pay for it.
 - > In case polluter is not identified, SPCB executes the clean-up plan.
- **Funding for assessment/remediation:** Initial assessment costs may be covered by Central Government from Environmental Relief Fund under Public Liability Insurance Act, 1991 and by State Government.
- **Penalties:** State Board may impose fines for failure to clean up.

3.4.3. HAZARDOUS AND OTHER WASTES (MANAGEMENT AND TRANSBOUNDARY MOVEMENT) AMENDMENT RULES, 2025

Why in the News?

Hazardous and Other Wastes (Management and Transboundary Movement) Amendment Rules, 2025 were notified by Ministry of Environment, Forest and Climate Change (MoEFCC) to be enforced from 1st April, 2026.

About the Rules

- Introduces comprehensive Extended Producer Responsibility (EPR) framework for Scrap of Non-Ferrous Metals (including aluminium, copper and zinc and its alloys).
 - EPR is a policy approach making producers responsible for end-of-life management of products and packaging.
 - E-Waste (Management and Handling) Rules, 2011, introduced the concept of EPR in India.
- Targets: Every producer shall be responsible for recycling target structure, which progressively increases from 10% in 2026-2027 to 75% by 2032-2033.
- Central Pollution Control Board: Shall generate an EPR certificate through portal.
- Validity of the EPR certificate: Two years from the end of financial year when generated.

3.5. OTHER IMPORTANT NEWS

News	Details
WHO Global Conference on Air Pollution and Health	Co-organized by WHO and Columbia and other UN Agencies like UNEP, WMO etc. <ul style="list-style-type: none">• Objectives: Accelerating action for clean air, clean energy access and climate change mitigation.• Key Highlights: Over 50 countries, committed to shared goal of reducing health impacts of air pollution by 50% by 2040.<ul style="list-style-type: none">○ India reaffirmed its commitment by 2040 under National Clean Air Programme.
Smog Eating Technology	Delhi Government ordered study on use of Smog Eating photocatalytic coatings on roads. <ul style="list-style-type: none">• Objective: Reduce nitrogen dioxide (NO₂) and harmful hydrocarbons in public spaces, improving air & water quality.• Mechanism- Photocatalytic activity: Uses light energy to break down harmful pollutants & organic waste.<ul style="list-style-type: none">○ Usually uses titanium dioxide (TiO₂) coatings as photocatalysis under UV light to decompose NOx.
Global Outlook Council on Water	The President of South Africa announced its launch as a G20 Presidential Legacy Initiative.

Investments (GOCWI)	<ul style="list-style-type: none">It forms a core pillar of the Global Water Partnership's (GWP) Global Transformation Agenda on Water Investments.GWP is a multi-stakeholder action network and intergovernmental organisation dedicated to equitable, sustainable, and efficient management of water resources.GWP's Transformation Agenda aims to mobilise 15 billion for water security by 2030.It will serve as a high-level platform to sustain political and financial momentum for water investments worldwide.
River Cities Alliance (RCA)	<p>National Mission for Clean Ganga (NMCG) approved 2025 Action Plan under RCA, for mainstreaming river-sensitive urban planning in Indian cities.</p> <ul style="list-style-type: none">Joint initiative of Ministry of Jal Shakti and Ministry of Housing and Urban Affairs, launched in 2021.145 member cities. (Any river city can join the Alliance at any time).Objective: Strengthen institutional capacity, inter-city collaboration, and support Urban River Management Plans (URMPs).<ul style="list-style-type: none">URMP Framework: First of its kind approach launched in 2020 by National Institute of Urban Affairs (NIUA) and NMCG.Five cities (Kanpur, Ayodhya, Chhatrapati Sambhaji Nagar, Moradabad, Bareilly) have created URMPs.Chhatrapati Sambhaji Nagar's Kham River Restoration Mission was globally recognised by World Resources Institute's Ross Centre Prize for Cities.
Dumpsite Remediation Accelerator Programme (DRAP)	<p>It was launched under the Swachh Bharat Mission-Urban (SBM-U) 2.0.</p> <ul style="list-style-type: none">It is a year-long, targeted initiative under SBM-U 2.0 to achieve the goals of Lakshya Zero Dumpsites by September 2026.<ul style="list-style-type: none">SBM-U 2.0 was launched in 2021 to achieve Garbage Free Status for all cities. It also aims at remediation of all legacy dumpsites and converting them into green zones.Objective: Prioritize high-impact locations, covering ~8.8 crore MT of legacy waste (aged municipal solid waste) in landfills or dumpsites, mix of partially or completely decomposed biodegradable waste, plastic waste, etc.)Ministry: Ministry of Housing and Urban Affairs (MoHUA).Eligibility: All States/UTs with ongoing legacy waste projects with priority to sites containing over 45,000 MT of legacy wastes.<ul style="list-style-type: none">No minimum threshold for eligibility for UTs and North Eastern States. <p>Dumpsites Management in India</p> <ul style="list-style-type: none">Major emissions of primary concern: Leachate; Landfill Gas (Mixture of carbon dioxide and methane formed because of anaerobic conditions)Key Technologies: Biocapping- Transforming dumpsite from a wasteland to a natural environment like park; Biomining- Uses microorganisms to extract materials of economic interest.
National Level Pollution Response Exercise (NATPOLREX-X)	The Indian Coast Guard (ICG) conducted its 10th edition. <ul style="list-style-type: none">A biennial flagship exercise which aims to evaluate and enhance India's national preparedness to respond to marine oil spill incidents.

3.6. TERMS/CONCEPTS IN NEWS

3.6.1. GROUND-LEVEL OZONE (GLO)

Central Pollution Control Board (CPCB) report found Delhi-National Capital Region (NCR) to be **worst impacted** by high Ozone (O_3) pollution, followed by Mumbai Metropolitan Region (MMR).

About Ground-level Ozone (GLO)

- Secondary, **short-lived pollutant** that remains in atmosphere for only hours to weeks.
- Factor Responsible:** Created by chemical reactions between **oxides of nitrogen (Nox)** and **volatile organic compounds (VOC)**.
 - Anthropogenic sources:** Transportation, power plants, **residential, agricultural activities**, etc.
 - Natural sources:** Soil-based emissions of Nox, and wildfire-induced CO and biospheric methane emissions.
- Safe eight-hourly ozone** standard is **100 micrograms/cubic metre ($\mu\text{g}/\text{m}^3$)**, while one-hour limit is **180 $\mu\text{g}/\text{m}^3$** .
- Impact:** **Health** (Worsens Bronchitis, triggers asthma); **Climate** (major component of smog); **agricultural and ecosystem impacts, etc.**

3.6.2. SECONDARY POLLUTANTS

Study by Centre for Research on Energy and Clean Air (CREA) found that secondary pollutants, **account for nearly one-third of India's PM2.5 pollution**.

Secondary Pollutants

- Formed in atmosphere due to **chemical/physical interactions between primary pollutants themselves or between primary pollutants and other atmospheric components**.
- Sources:** Primary pollutants, sunlight, and atmospheric conditions.
- Examples:** Ozone (O_3), sulfuric acid (H_2SO_4), nitric acid (HNO_3), etc.

3.6.3. TOXIC HEAVY METALS

Study by **Bose Institute, Kolkata** under **Department of Science & Technology** shattered the **myth of "clean"** mountain rain and found toxic heavy metal pollution in Himalayas, more pronounced in **Eastern Himalayas**.

About Heavy Metals (HM) and HM Pollution

- Characteristics:** High **atomic weight** ranging from **63.5 to 200.6** and **density >4000 kg/m³**. E.g., zinc, copper, cadmium, cobalt, arsenic, lead, chromium, etc.
 - Comprise over **50 elements** on periodic table of which about 17 are **extremely lethal**.
- Heavy metals/metalloids** are **nondegradable** and **accumulate over decadal timescales** in soils.
- Occurrence:** Naturally occurring in Earth's crust.
- Sources of Pollution:** Bedrocks (soil parent materials) and atmospheric transportation after volcanic emissions and wind erosion; **Metal-based industrial activities** like smelting, mining, foundries, and the leaching of metals, **Agricultural** (irrigation, phosphorus fertilizers etc.), **household** (paints, batteries etc.), etc.
- Impact:**
 - Cadmium:** A potential human carcinogen, kidney and bone damage, lung cancer.
 - Lead:** Developmental and neurobehavioral effects on fetuses, etc.
 - Arsenic:** Highly toxic in its inorganic form; Long-term of exposure can impact cognitive development cause cancer, skin lesions, cardiovascular disease and diabetes.

3.6.4. PER- AND POLYFLUOROALKYL SUBSTANCES (PFAS)

Researchers discovered nearly 20 species of bacteria capable of **breaking down PFAS**.

About PFAS

- Chemicals having **carbon-fluorine bonds**, which are **very strong and do not degrade easily**.
- They can **resist grease, oil, water, and heat**.
- Application:** Cookware, food packaging, food processing equipment, Fabrics, Paints, Foams etc.
- Impact:** Persists in environment (known as '**Forever Chemicals**'), contaminating air, water, soil, and bioaccumulates in humans and animals.

3.6.5. GREEN FIRECRACKERS

Easing temporarily the blanket ban on firecrackers in **Delhi-NCR**, Supreme Court allowed use of **government-approved green crackers** devoid of harmful chemicals and reducing air pollution.

About Green Firecrackers

- Composition:** Low Thermite amount, minimum usage of Aluminium.
- Does not **contain barium substance**, used in firecrackers to add green colour.
- Uses Potassium Nitrate** as oxidant.
- Benefit:** Reduce at least **30 % emissions** using particulate matter.
- Identification and Certification:** **CSIR NEERI Logo** (Developed by CSIR NEERI).
- First Introduced:** **Arjun Gopal vs Union of India (2018) judgment**, that banned conventional firecrackers.

Types of Green Firecrackers



SWAS (Safe Water & Air Releaser)

Emit very fine water droplets that absorb dust



SAFAL (Safe Minimal Aluminium)

Contain safe amount of aluminium & are quieter



STAR (Safe Thermite Cracker)

Free from potassium nitrate and sulfur; emit minimal smoke

3.6.6. FLUE GAS DESULPHURISATION (FGD)

A study commissioned by Office of the **Principal Scientific Adviser** recommended rollback of 2015 policy mandating **installation of FGD systems** in all of India's coal-fired plants.

- Rather, it recommended FGD to only those plants **using imported coal or high (>0.5%) sulphur coal**.

About FGD

- Involves **removal of SO₂ (Sulphur Dioxide)** in exhaust gases from coal-fired power plants before being released to atmosphere.
- Uses **scrubbing technique** involving **alkaline reagent** (typically a sodium- or calcium-based alkaline reagent).
- Types of FGD Systems:** Dry Sorbent Injection, Wet Limestone Based, Sea Water Based, etc.

3.6.7. TAJ TRAPEZIUM ZONE (TTZ)

Supreme Court directed **NEERI (National Environmental Engineering Research Institute)** to assess the impact of neighbouring **glass industry** on Taj Mahal.

- SC in past issued orders from time to time for **TTZ** (E.g., ban of coal/coke in industries in TTZ, 1996).

About TTZ

- Location:** **10,400 sq km area** (shaped like trapezoid) around Taj Mahal for preventing its pollution.
- Coverage:** **Three World Heritage Sites**- Taj Mahal, Agra Fort, and Fatehpur Sikri.
- Taj Trapezium Zone Pollution (Prevention and Control) Authority:** Under **Environment Protection Act, 1986**.
- Categories of Industries:** Red, Green, Orange, and White based on their pollution potential, as defined by the Central Pollution Control Board (CPCB).

3.6.8. ENVIRONMENTAL FLOW (E-FLOW)

Union Jal Shakti Minister led a meeting focused on **(E-flow)** of Ganga River and its tributaries.

About E-Flow

- Refers to **quantity, timing, and quality of water flow required to sustain freshwater ecosystems and livelihoods** that depend on them.

- **Benefits:** Maintains ecological integrity of rivers and their estuaries.
- Extensive interventions in river flow like construction of dams, pollution, and encroachments have severely impacted ecological balance of rivers.

3.7. RELATED REPORTS/INDICES IN NEWS

Report/Indices	Detail
State of Global Air Report (SoGA) 2025	<ul style="list-style-type: none">• Released by: Health Effects Institute (HEI) and Institute for Health Metrics and Evaluation (IHME), USA.• Mortality: Around 2 million deaths in 2023 linked to air pollution contributing 52% global share.• Ozone Pollution: India has third highest exposure.
2025 Annual Update of the Air Quality Life Index (AQLI)	<ul style="list-style-type: none">• Developer: Michael Greenstone (Professor) and others at Energy Policy Institute at University of Chicago (EPIC).• Measures the impact of particulate air pollution on life expectancy.• Key Highlights:<ul style="list-style-type: none">○ Air pollution meeting WHO guidelines could extend Indian residents' lives by 3.5 years on average, with Delhi seeing an 8.2-year gain (highest).○ South Asia continues to be World's most polluted region
Global Trade Update on Mobilising trade to curb Plastic Pollution	Released by: UNCTAD (UN Trade and Development)

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4. SUSTAINABLE DEVELOPMENT

4.1. 10 YEARS OF SDGS: INDIA'S PROGRESS

Why in the News?

UN Sustainable Development Goals (SDG) completed **10 years of adoption** since September 2015.

About Sustainable Development Goals (SDGs)

- Sustainable development was first defined in World Commission on Environment and Development's **1987 Brundtland report** as development that meets the needs of present without compromising the ability of future generations to meet their own needs.
- In **2015**, all United Nations countries adopted **2030 Agenda for Sustainable Development**.
 - Sets out **17 SDGs and 169 targets**.
- SDGs are successors to **Millennium Development Goals (MDGs)**.
 - Established in 2000, MDGs are set of eight goals with deadline 2015.

Progress towards SDGs (10th edition of Sustainable Development Report (SDR), 2025)

- Global**
 - Finland** ranked **first** with a score of 87, followed by Sweden and Denmark.
 - On average, **East and South Asia** has shown **fastest progress on SDGs since 2015**.
 - Only **17% of SDG targets are on track** to be achieved by 2030.
 - SDG 1 and 10 on track; SDG 13 Decreasing.
- India**
 - For the first time, **India ranks among top 100 in SDG Index at 99 in 2025** with a score of 67 out of 100.

Key Highlights of India's Achievements	
SDG	Achievement(s)
SDG-1 (No Poverty)	Over 135 million people moved out of multidimensional poverty between 2015-2016 and 2019-2021. (NITI Aayog SDG India Index 2023-24)
SDG-3 (Good Health and Well-Being)	Maternal mortality ratio (Per 100,000 live births) declined to 80.5 in 2023 from 130 in 2014-16. (SDR, 2025)
SDG-4 (Quality Education)	Net primary enrolment rate is 99.9% in 2024. (SDR, 2025)
SDG- 7 (Clean Energy)	99.2% population have access to electricity in 2022. (SDR, 2025)

4.1.1. OTHER REPORTS RELATED TO SDGS

Global	
Report	Details
Sustainable Development Report (SDR) 2025	<ul style="list-style-type: none">Released by: SDG Transformation Centre, under Sustainable Development Solutions Network (SDSN).<ul style="list-style-type: none">SDR Index is released as part of annual SDR by United Nations SDSN since 2016.<ul style="list-style-type: none">Established in 2012, UNSDSN operates under UN Secretary-General.Presented on a scale of 0 to 100, 100 indicating full achievement of all goals.
Sustainable Development Goals Report (SDGR) 2025	Prepared by: UN DESA , in collaboration with the entire UN Statistical System, consisting of more than 50 international and regional agencies Only UN official report that monitors global progress of SDGs .
“Progress on the Sustainable Development Goals: The Gender Snapshot 2025”	Released by: UN Women and UN DESA (Department of Economic and Social Affairs).

India	
SDG India Index	Released by: NITI Aayog, central coordinating body for SDG implementation.
District SDG Index 2023–24 for the Northeast Region (NER)	Released by: NITI Aayog Hnahthial (Mizoram) is ranked as best performing district.
National Indicator Framework (NIF) Progress Report 2025	Launched by: MoSPI
Voluntary National Review (VNR) Report 2025	<ul style="list-style-type: none">• Released by: NITI Aayog• Marks India's 3rd VNR (previous submissions in 2017 and 2020).<ul style="list-style-type: none">◦ VNR is a process through which countries assess and present their progress towards achieving SDGs.

4.2. FINANCING FOR SUSTAINABLE DEVELOPMENT

Why in the News?

Recently, the 4th International Conference on Financing for Development (FFD4) adopted the final outcome document Compromiso de Sevilla, also known as **Sevilla Commitment**, to address the SDG financing gap in developing countries.

About Sevilla Commitment

- Adopted by consensus, lays out a path to close the \$4 trillion annual SDG financing gap in developing countries.
- **United States decided to exit the process entirely.**

New financing mechanisms announced under the Sevilla Commitment:

- **Debt-for-Development Swap Programme:** A deal between a government and its lenders to cancel or reduce debt in exchange for the government agreeing to spend money on a development goal.
- **Debt “Pause Clause” Alliance:** Aims to include “pause clauses” in lending to suspend debt service payments during crises.
- **Debt Swaps for Development Hub** (led by Spain and the World Bank): To enhance collaboration to scale up debt swaps and lower debt service burdens.
- **Sevilla Forum on Debt:** To help countries learn from one another and coordinate their approaches in debt management and restructuring, with a UN entity serving as its secretariat, with support from Spain.
- **Blended finance platform, SCALED:** Launched to scale up blended financing to create scalable blended finance instruments.
 - Blended finance is a financing method that strategically **combines public, philanthropic, and private capital** to fund sustainable development initiatives.
- **An Effective Taxation of High-Net-Worth Individuals initiative** (led by Brazil and Spain): To ensure high-net-worth individuals pay their fair share.
- **Coalition for Global Solidarity Levies** (led by France, Kenya and Barbados): Aims to tax premium-class flying and private jets to raise funds for climate action and sustainable development.
- **FX EDGE Toolbox** (Inter-American Development Bank) and **Delta Liquidity Platform** (European Bank for Reconstruction and Development) for local currency lending.
- **A coalition led by the UK and the Bridgetown Initiative:** To scale-up pre-arranged financing from 2% to 20% of total disaster financing by 2035.

Evolution of Financing for Sustainable Development



Monterrey Consensus (2002)

- Marked beginning of **Financing for Development process at United Nations**
- It focused on increased **Official Development Assistance (ODA)**, aid effectiveness (Paris Declaration), Governance Reforms (E.g. in IMF) and innovative financing mechanisms.



Doha Declaration (2008)

- It reaffirmed Monterrey Consensus **amid financial crisis of 2008**.
- It added new understandings to financing based on **gender and environment** (laid the foundation for **Green Climate Fund**).



Addis Ababa Action Agenda (2015)

- It introduced new financing frameworks for sustainable development such as **Integrated National Financing Frameworks (INFFs)**, Technology Bank for Least Developed Countries etc.
- It set the stage for future initiatives **by reinforcing the 2030 Agenda commitment**.

4.3. ENERGY EFFICIENCY AND ALTERNATIVE FUELS/ENERGY

4.3.1. RENEWABLE ENERGY SECTOR

Why in the News?

In 2025 India's renewable energy sector achieved two historic milestones- renewable energy met **51.5 % of total electricity demand** (July 2025) and **share of installed electricity capacity of non-fossil fuel sources** reached **51 %** (September 2025).

India's key targets for renewable energy sector

- Nationally Determined Contributions (NDC) target** (Updated in 2022)
 - Achieving **50%** of cumulative electric power installed capacity from non-fossil fuel-based energy resources by 2030 (**achieved five years ahead**).
- Panchamrita targets (for 2030)**
 - Meet **50% of energy requirements** from **renewable energy**
 - Reach **non-fossil energy capacity of 500 GW**

Status of India's Renewable Energy (RE) sector

- Installed electricity capacity of non-fossil fuel sources** (renewable energy, hydro, and nuclear): 256.09 GW (September 2025)
- Category wise share (descending order): Solar (39.4%); Wind (10.6%); Hydro power (10%); Biomass/Cogeneration (2.1%); Waste to Energy (0.2%); Nuclear (1.8%); Small Hydropower (1%).**
- Global Ranking (IRENA RE Statistics 2025): 4th in Renewable Energy Installed Capacity; 4th in Wind Power; 3rd largest ethanol producer and 3rd in Solar Power capacity.**
- Progress:**
 - ~3 times increase in Installed RE capacity (2014 to 2025).**
 - ~40-fold increase in Solar energy (2014 to 2025).**
 - 30% increase in Wind energy capacity (2020-2024).**
- Top 5 RE states:** Rajasthan, Gujarat, Tamil Nadu, Karnataka, Maharashtra.

4.3.2. INTERNATIONAL SOLAR ALLIANCE (ISA)

Why in the News?

Mauritius Became 1st African Country to sign **ISA's CPF (Country Partnership Framework)** and 8th Session of the ISA Assembly was held in **New Delhi**.

Key highlights of the Session

- **Launch of SUNRISE (Solar Upcycling Network for Recycling, Innovation & Stakeholder Engagement)**- a global initiative on circularity and end-of-life (EoL) management of solar PV and batteries.
- **Small Island Developing States (SIDS) Procurement MoU:** By 16 SIDS under ISA-World Bank platform.
- **Released ISA's flagship reports:** Ease of Doing Solar 2025; Solar Trends 2025.
- **Other: Global Capability Centre** unveiled to create a **Silicon Valley for Solar** in India, **ISA Academy** (AI-based online learning platform) launched.



International Solar Alliance (ISA)

 Gurugram (Haryana), India

 **About:** Treaty-based intergovernmental organization for promoting solar energy as a sustainable solution for energy access and climate change.

 **Genesis:** Launched in 2015 by India and France at COP21 of UNFCCC summit in Paris.

 **Member Countries** (signed & ratified the Agreement): 104 (March 2025)

- ▷ Following 2020 amendment to its Framework Agreement, all UN members are now eligible to join.

 **Mission:** Guided by its **Towards 1000 strategy**, which aims to –

- ▷ Mobilize **USD 1,000 billions of investments** in solar energy solutions by 2030.
- ▷ Deliver energy access to **1,000 million people** using clean energy solutions.
- ▷ **Installation of 1,000 GW of solar energy capacity.**
- ▷ Mitigate global solar emissions of around **1,000 million tonnes of CO₂** annually.

 **Initiatives undertaken by ISA:** SolarX Startup Challenge; STAR-C Initiative; Global Solar Facility; Green Hydrogen Innovation Centre; One Sun, One World, One Grid, etc.

4.3.3. SOLAR PANEL EFFICIENCY NORMS

Why in the News?

Ministry of New and Renewable Energy (MNRE) eased solar panel efficiency norms for off-grid rural projects allowing lower efficiency modules to be included in **Approved List of Models and Manufacturers (ALMM)**.

Key Changes in Solar Efficiency Norms (May 2025 Amendment)

- **ALMM** is a list of models and manufacturers of solar photovoltaic (PV) modules approved by MNRE.
- **Efficiency Standards Reduced:**
 - **Previous (Off-grid <200W) Efficiency:** Crystalline silicon at **19%** and Cadmium Telluride at **18%**.
 - **New Standard:** Both technologies at **18% efficiency**.
- **Scope of Change:** Applies only to **off-grid solar applications below 200W** like **Solar lanterns, Micro solar grids, Streetlights, Small fans and appliances**.
 - Does **not affect** larger systems (e.g., rooftop solar, pumps).
- **Introduction of Distributed Renewable Energy (DRE) category:** To support **smaller manufacturers & Wider rural electrification**.
 - **Distributed Renewable Energy (DRE):** Electricity generated from renewable sources, like sun or wind, near the point of use.

About Solar Photovoltaic (PV) Energy

- PV solar technology **directly converts sunlight into electricity** using panels made of semiconductor cells.

- It uses **photovoltaic cells**, typically made of silicon, assembled into panels, which can be used in both small-scale installations, like on rooftops, or in large solar power plants.
- It produces **direct current (DC)**, which is then converted to alternating current (AC) by an inverter.
- Other types of technologies for harnessing Solar Power:**
 - Solar Thermal Energy:** Harnesses the sun's heat through solar thermal panels to generate electricity or provide heating solutions.
 - Concentrated Solar Power (CSP):** Harness the sun's energy by focusing sunlight using mirrors, lenses, and tracking devices.

Related News: Agriphotovoltaics (APVs) or Solar Farming

- APVs could provide a model that maximises land-use efficiency and augments farmers' income.
- Definition:** Combined use of same land area for agricultural production and electricity production utilizing a solar PV system.
- Components:** Solar panels, solar tracking systems (follow the sun for maximum efficiency), and shade-tolerant crops (protection against strong solar irradiation, winds).

4.3.4. NATIONAL GREEN HYDROGEN MISSION (NGHM)

Why in the News?

Centre launched **Green Hydrogen Certification Scheme of India (GHCI)** under NGHM.

About GHCI

- Ministry:** Ministry of New and Renewable Energy (MNRE)
- Purpose:** Develop detailed methodology for **measurement, monitoring, reporting, onsite verification, and certification** of Green Hydrogen and its derivatives.
- Nodal Authority:** Bureau of Energy Efficiency (BEE).
- Certification details:**
 - Certification Scope:** Shall operate at project level for green hydrogen production,
 - Processes like transport and storage of hydrogen outside plant boundaries, conversion into hydrogen carriers, are **excluded from certification scope**.
 - Two Types: concept** (voluntary) and **facility level certificate** (mandatory).
 - Calculation of GHG emissions intensity** for GH production shall follow **MNRE Green Hydrogen Emission Calculation Methodology**.
 - '**Green**' Certification is **conditional** on meeting average **emission intensity** requirements of 2 kg CO₂eq/kg H₂ or less.
 - Certificate is **non-transferable** and **cannot** be claimed for any **emission reduction credits**.

About Green Hydrogen

- Hydrogen produced through electrolysis, splitting water molecules into hydrogen and oxygen** using electricity from renewable sources like solar, wind etc.
- Applications:** Decarbonizing sectors like Steel Production, Refineries and fertilizer plants, transportation, energy storage, etc.
- Challenges in adoption:** **High Cost of producing Green Hydrogen**, requires

Types of Hydrogen						
Colour						
Type	Black/Brown Hydrogen	Grey Hydrogen	Blue Hydrogen	Turquoise Hydrogen	Pink Hydrogen	Green Hydrogen
Process	Coal Gasification	Methane Reformation	Coal Gasification & Methane Reformulation with CCUS	Pyrolysis	Electrolysis	Electrolysis/ Biomass Gasification
Source	Coal	Natural Gas	Fossil Fuel	Methane	Nuclear Energy	Renewable Energy

high pressure tanks and cryogenic temperatures for storage, requires up to 9 litres water/kg of hydrogen, high electricity demand.

- It can be used **directly as a fuel** for internal combustion; **blended with natural gas** and used as fuel for heat or power generation; used in **hydrogen fuel cell to run vehicles etc.**

About NGHM

- Launched in **2023** to make India a **Global Hub** for production, usage and export of Green Hydrogen and its derivatives.
- Target:** Production of **5 MMT per annum of Green Hydrogen by 2030.**
- Key Components:** Strategic Interventions for Green Hydrogen Transition (SIGHT) programme; Green Hydrogen Hubs.
- Recently, 3 ports, **Deendayal Port Authority (Gujarat), V.O. Chidambaranar Port Authority (Tamil Nadu), and Paradip Port Authority (Odisha)** have been formally recognized as Green Hydrogen Hubs under NGHM.
- Indigenously-Built 1 MW Green Hydrogen Power Plant (GHPP) was **Commissioned at Kandla Port.**

4.3.5. BIOFUELS

4.3.5.1. NATIONAL BIOENERGY PROGRAMME (NBP)

Why in the News?

Recently, Ministry of New and Renewable Energy (MNRE) updated guidelines on '**Waste to Energy**' and '**Biomass**' components of **National Bioenergy Programme (NBP)**.

About National Bioenergy Programme

- Launched:** In 2022
- Implementation:** Two phases, total budget of Rs. 1715 Crore; **Phase-1 (2021-22 to 2025-26).**
- Objective:** Utilize **surplus biomass** (primarily from rural areas) for **power generation**.
- Central Financial Assistance (CFA):** To project developers on various aspects of projects.
 - 20% more CFA for **special categories** like North East Region, hilly states, SC/ST beneficiaries.
- 3 components**
 - Waste to Energy Programme:** Through technologies like **pyrolysis and plasma gasification**, supports projects for **generating Biogas, BioCNG, Power, or Syngas** from urban, industrial, and agricultural waste/residues.
 - Biomass Programme:** Support Biomass Briquette/Pellet manufacturing plants and Biomass (non-bagasse) based cogeneration projects.
 - Biogas Programme:** Support biogas plants for clean cooking fuel, small power needs, improved sanitation, women empowerment, etc.
 - Biogas is 95% methane (CH_4) and CO_2 , with traces of N_2 , H_2 , H_2S , and O_2**

Key Features of Revised Guidelines

Waste to Energy Programme	Biomass Programme
<ul style="list-style-type: none">Easier approvals for MSMEs and industry.Improved CFA Disbursal: Two-Stage Release:<ul style="list-style-type: none">50% CFA after consent from State Pollution Control Board, with bank guarantee.Remaining CFA after 80% capacity achievement or maximum limit. (lower of two).	<ul style="list-style-type: none">No clearance documents for briquette/pellet plants.Tech Integration: IoT-based monitoring.Stubble Burning Support: Pellet producers in NCR/nearby states can choose MNRE or Central Pollution Control Board (CPCB) scheme.

4.3.5.2. ETHANOL BLENDED PETROL (EBP) PROGRAMME

Why in the News?

Union Minister for Petroleum and Natural Gas announced India's achievement of 20% Ethanol blending target in petrol as per Ethanol Blended Petrol (EBP) Programme.

About Ethanol Blended Petrol (EBP) Programme

- **Genesis:** Launched in 2003 to promote blending of ethanol in petrol.
- **About Ethanol Blending**
 - Refers to the **process of mixing ethanol with petrol** for more sustainable and cleaner burning fuel.
 - **Types:** E10 (10% Ethanol by Volume), E20 (20% Ethanol), E85 fuel (85% ethanol by volume).
 - > Using E-20 gives better acceleration, better ride quality and lowered carbon emissions by approximately 30% as compared to E10 fuel.
- **Target:** National Policy on Biofuels (2018), amended in 2022, advanced target of 20% blending of ethanol in petrol to 2025-26 from 2030.
- **Status of Ethanol blending:**
 - **13-fold increase in Ethanol blending in petrol** (1.5% in 2014 to 20% in 2025).
 - Ethanol production increased from 38 crore litres in 2014 to over 660 crore litres in 2025.
- **National Policy on Biofuels:**
 - **Use of Sugarcane Juice, Sugar Beet, Cassava, Damaged food grains, Rotten Potatoes** unfit for human consumption for production.
 - **Use of Surplus food grains** to be used for ethanol production and blending with petrol.

About Ethanol (C_2H_5OH)

- **Renewable fuel**, anhydrous ethyl alcohol produced from sugarcane, maize, wheat, and crops with high starch content.
- Naturally produced by **fermentation of sugars** by yeasts or via **petrochemical processes** like ethylene hydration.
- Has **High-octane** rating but is **27% less energy dense** than petrol.
- Serves as a petrol **additive** and as a **standalone** fuel (E85, E100) in flex-fuel cars.
- **Non-Fuel Use:** Sanitisers, perfumes, beverages, and industrial solvents.
- **By-Products:** Distillers' dried grains (DDGS) from grain ethanol are reused as **animal feed**.
- **Status:** India is **world's third largest producer** (after USA and Brazil) and consumer of Ethanol.
 - Maharashtra, Uttar Pradesh, and Karnataka are top ethanol producers.

About Biofuels and its Generations

Liquid or gaseous fuels produced from biomass (renewable resources). Used in place of or in blend with, **diesel, petrol or other fossil fuels. E.g. Ethanol, Compressed BioGas (CBG) etc.**



1st Generation: Edible feedstocks (E.g. wheat, corn, and sugarcane), food-grade rapeseed, soy, or palm oil.



2nd Generation: Lignocellulosic biomass and Waste (E.g. Wheat bran, animal fats, wastes of cooking and frying oil, Jatropha curcas)



3rd Generation: Microalgae and Cyanobacteria biomass



4th Generation: Genetic engineered microorganisms. E.g. Escherichia coli and Saccharomyces cerevisiae

Initiatives facilitating Ethanol Blending

- **PM JIVAN (Jaiv Indhan- Vatavaran Anukool fasal Awashesh Nivarjan) Yojana:** Second Generation (2G) ethanol projects.
- **Ethanol Interest Subvention Schemes (EISS):** Establishment of Dedicated Ethanol Plants (DEPs).

- Reduction in GST on ethanol meant for EBP Programme from **18% to 5%**.
- Amendment to Industries (Development & Regulation) Act, 1951.
- Government allows production of ethanol from sugarcane juice, molasses during ESY 2025-2026.

4.3.5.3. OTHER BIOFUELS IN NEWS

Fuel	Details
Bioethanol	<p>Prime Minister inaugurated India's first Bamboo-based Bio-Ethanol Plant in Assam.</p> <ul style="list-style-type: none">Bamboo is an attractive feedstock for production of bioethanol, as it is a non-food crop and contains a high lignocellulose content making it a 2G Ethanol. <p>About Bioethanol</p> <ul style="list-style-type: none">Ethanol produced from renewable biological sources like food crops; agricultural wastes.Sources: According to National Policy on Biofuels 2018, Bioethanol is ethanol produced from biomass such as:<ul style="list-style-type: none">Sugar containing materials, like sugar cane, sugar beet, etc.Starch containing materials such as corn, cassava, etc.Cellulosic materials such as bagasse, wood waste, etc.Applications: Fuel (pure ethanol fuel (E100) or blended with petrol (E10 or E20)), pharmaceuticals, personal care products, bio-based materials like bioplastics.
E-Methanol (or electro-methanol)	<p>Recently, World's first commercial-scale E-Methanol plant began operations in Denmark.</p> <p>About E-Methanol</p> <ul style="list-style-type: none">Low-carbon energy produced by combining green hydrogen with captured carbon dioxide.E-methanol production typically involves three key steps:<ul style="list-style-type: none">Green hydrogen generation: Renewable energy-powered water electrolysis creates hydrogen feedstock.CO2 capture: Captured from industrial flue gases (e.g. steel mills/cement plants) or directly from air, reducing overall emissions at source.Methanol synthesis: Hydrogen and CO2 are combined in catalytic reactor under pressure, yielding methanol with minimal by-products.Applications: Shipping industry, its derivatives gasoline and kerosene used in transport.Methanol Economy' Programme in India (by NITI Aayog)Benefits: Create 5 million jobs through methanol production, Rs 6000 crore can be saved annually by blending 20% DME (Di-methyl Ether, a derivative of methanol) in LPG.
Compressed Biogas (CBG)	<p>Recently, India's First Cooperative Multi-Feed CBG Plant was inaugurated in Maharashtra.</p> <ul style="list-style-type: none">Developed with assistance of National Cooperative Development Corporation (NCDC) to produce 12 tons of CBG daily and 75 tons of potash from jaggery, molasses, etc. <p>About CBG</p> <ul style="list-style-type: none">Prepared from raw biogas and can be used as a clean /renewable fuel, like CNG.<ul style="list-style-type: none">Raw biogas is produced by anaerobic digestion of biomass and waste sources like agricultural residue, cattle dung, food waste, etc.Biogas mainly contains: Methane (CH_4): 55–60%; Carbon dioxide (CO_2): 35–40%; Other impurities: H_2S, water vapor, etc.

- Raw biogas is purified to remove H₂S, CO₂, and water vapor, increasing methane concentration to 90%, and is then compressed to about 200–250 bar pressure to get CBG.
- Initiatives taken in India to promote CBG
 - Galvanizing Organic Bio-Agro Resources Dhan (GOBAR-DHAN) scheme: Convert cattle dung and solid waste in farms to Bio-CNG (CBG) and compost.
 - Sustainable Alternative Towards Affordable Transportation (SATAT) initiative: Setting up Compressed Biogas (CBG) plants for production of CBG.

4.3.6. NATIONAL POLICY ON GEOTHERMAL ENERGY (NPGE, 2025)

Why in the News?

Union Ministry of New & Renewable Energy (MNRE) notified India's first NPGE, 2025.

About Geothermal Energy

- It harnesses heat stored within Earth's crust.
- **Key Sources and applications-**
 - **High-enthalpy (~200°C) resources:** Like volcanic regions, geysers and hot springs, suitable for electricity generation.
 - **Low- to medium-enthalpy (100–180°C) resources:** Like hot rocks and shallow ground layers suitable for **direct-use applications** like heating and cooling, agri-food, aquaculture, etc.
- **Estimated Potential in India:** 10,600 MW (Geothermal Atlas of India, 2022)
 - GSI identified 381 hot springs and 10 geothermal provinces (see infographic)
 - **Puga and Chumathang in Ladakh** are most promising.
- **Significance:** 95% lower emissions than fossil fuel, Inexhaustible energy source etc.

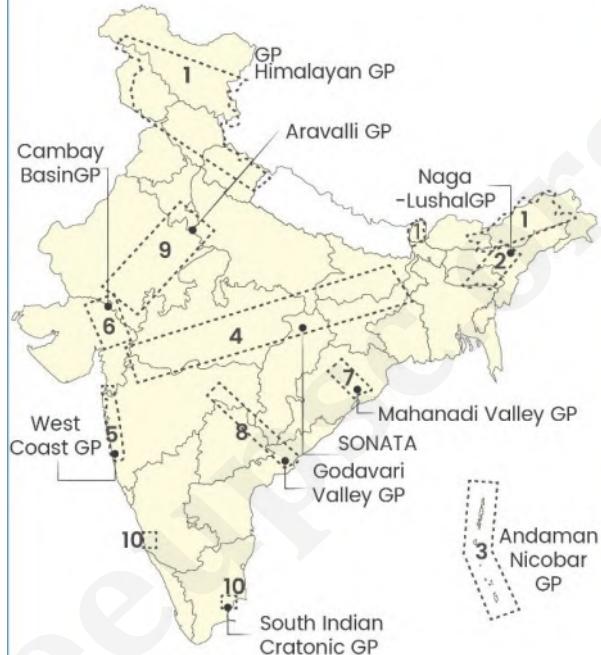
About National Policy on Geothermal Energy (NPGE, 2025)

- **Vision:** To establish geothermal energy as a **major pillar of India's renewable energy mix, achieving net zero carbon emission by 2070.**
- **Nodal Ministry:** MNRE

Key features of the Policy

- **Scope of policy:**
 - **Geothermal Resource Assessment**, Direct use, Ground (geothermal) Source Heat Pump (GSHP) etc.
 - **Emerging Innovative Technologies** like Enhanced Geothermal Systems (EGS), Advanced Geothermal Systems (AGS), geothermal energy storage, etc.
 - **Extracting GE from abandoned oil and gas wells.**
 - **Mineral by-products** like silica, borax, cesium, lithium, etc. subjected to rules and payment of royalty under MMDR Act.
- **Creation of a geothermal resource data repository**
- **Developmental Model**
 - **Preference to indigenous geothermal technologies**
 - **Economic feasibility models:** like revenue sharing, etc.

India's Geothermal Provinces (GPs)



Note: Provinces 1, 2, and 3 are orogenic, while Provinces 4 to 10 are non-orogenic.

- **Central funding assistance:** To Northeastern Region and special category states.
- **Joint ventures:** Between oil and gas companies, mineral companies, etc.
- **Financing Mechanisms**
 - **Renewable Energy Research and Technology Development Programme (RE-RTD)** provides up to 100% financial support to Government/non-profit research organizations and upto 70% to Industry, start-ups, private Institutes, entrepreneur, and manufacturing units
- **Fiscal incentives:** GST/Import duty exemptions on equipment, services, etc.
- **Support mechanisms:** Inclusion in **Indian Carbon Credit Trading Scheme**; eligibility for Renewable Purchase Obligation (RPO) etc.
- **Guidelines for States and Union Territories**
 - For granting geothermal **exploration/development permit and land lease**
 - > Exploration leases may be **granted for 3 to 5 years**.
 - > Lease for development for power generation or direct-use applications for up to **30 years**.

Other recent Steps taken to promote Geothermal energy

- **Geological Survey of India (GSI)** published '**Geothermal Atlas of India, 2022**'.
- **Renewable Energy Research and Technology Development Programme (RE-RTD) by MNRE**
- **Singareni Collieries Company limited (SCCL)** commissioned a 20 kW pilot geothermal power plant in Manuguru area of **Bhadradri Kothagudem district in Telangana**.
- **Northeast's 1st geothermal well at Dirang, Arunachal Pradesh** along with Norway and Iceland.
- **State Specific:** Uttarakhand Cabinet approved the Uttarakhand Geo-Thermal Energy Policy 2025.

4.3.7. WIND ENERGY

Why in the News?

MNRE updated its wind turbine approval system, renaming the Revised List of Models and Manufacturers (RLMM) to the Approved List of Models and Manufacturers (Wind) or ALMM (Wind).

About RLMM 2018

- A mechanism to **ensure quality and reliability of wind turbines** installed in the country.
- **Key Features of ALMM Wind:** Mandatory sourcing of key components (blades, towers, gearboxes, etc.,) from approved Indian suppliers, data localization, R&D Centers, Quality standards, etc.
- **Exemption:**
 - Already-bid projects or captive/open access projects within 18 months
 - New manufacturers/models exempt for 800 MW over 2 years to promote innovation.

About India's Wind Energy Sector

- India currently ranks **4th in the world** for installed wind power capacity.
- Wind contributing **4.69% to total electricity generation**.
- **Wind potential** of the country is **1164 GW** at 150 meters above ground level (National Institute of Wind Energy)
- India aims to cater **10% of global wind energy equipment demand by 2030**.

4.3.8. DRAFT GUIDELINES FOR UNDERGROUND COAL GASIFICATION (UCG)

Why in the News?

Draft Guidelines for UCG dealing with preparation of mining and mine closure plans for UCG blocks, etc., were released.

Key Guidelines

- To ensure **scientific mine closure**, companies will be required to maintain an **escrow account with the Coal Controller Organization (CCO)**.

- CCO (Ministry of Coal) collects and maintains coal production data of all private and public sector coal mines.
- CCO acts as the **appellate authority** in case of **disputes between consumers and owners** arising out of declaration of grade and size of coal.

About Coal Gasification

- **Thermochemical process** that converts coal into **syngas** — a mixture of **carbon monoxide (CO)**, **hydrogen (H₂)**, **carbon dioxide (CO₂)**, **methane (CH₄)** and other gases.
 - Syngas can be used for **electricity production**, **energy-efficient fuel cell technology**, **produce downstream products like methanol, ammonium nitrate, Synthetic Natural Gas (SNG) and Ammonia (for Urea/fertilizers) etc.**
 - It involves the **partial oxidation at high temperature and pressure**.
 - **Challenges for Coal Gasification Technology:** Heavy upfront investment; high ash coal in India unsuitable for gasification technology; uncertain supply; high input cost, etc.
- **Coal Gasification Financial Incentive Scheme (CGFIS):** Launched in 2024; to achieve **100 million tonnes of coal gasification by 2030**.

4.3.9. ADEETIE SCHEME

Why in the News?

Recently, **Assistance in Deploying Energy Efficient Technologies in Industries & Establishments (ADEETIE) scheme** was launched.

About ADEETIE

- Help **Micro, Small, and Medium Enterprises (MSMEs)** reduce energy consumption by **30–50%**, improve power-to-product ratio, and support creation of **green energy corridors**.
- **Ministry:** Ministry of Power.
- **Eligible Enterprises:** MSMEs with **Udyam ID**.
 - **Entities must demonstrate 10% energy savings** of implemented technologies.
- **Implementation:** Bureau of Energy Efficiency (BEE).
- **Scheme Duration:** 3 years (FY 2025-26 to FY 2027-28).
- **Budgetary outlay:** ₹1000 crore.
- **Target Sectors:** 14 **energy-intensive** sectors like Brass, Bricks, Ceramics, Chemicals, Fishery, Food Processing, etc.
- **Implementation Approach:** Phased roll-out, **first phase with 60 industrial clusters**, and additional **100 clusters** in the **second phase**.
- **Scheme components**
 - **Interest Subvention:** 5% for **Micro and Small Enterprises** and 3% for **Medium Enterprises** on loans.
 - **Streamlined Implementation:** Support for Investment grade energy audits and preparation of Detailed Project Reports, etc.
 - **Support Provided:** Technical handholding, financial incentives, Assistance in conducting Investment Grade Energy Audit, etc.

4.3.10. CORPORATE AVERAGE FUEL EFFICIENCY (CAFE) NORMS

Why in the News?

Bureau of Energy Efficiency (BEE) revised draft CAFE-3 and CAFE-4 norms, offering special relief for small cars and incentives for flex fuel and strong hybrid vehicles.

About CAFE norms

- CAFE-I first notified by the Government in **2017**, under the **Energy Conservation Act, 2001**
 - CAFE-3 norms shall come into force from **1st April 2027 until 31st March 2032**.
- **Aim:** Mitigate fuel consumption by lowering CO₂ emissions, reduce oil dependency and air pollution.

- Applicability:** Passenger cars with seating capacity not exceeding 9 persons including driver and gross vehicle weight not exceeding 3,500 kg.



Bureau of Energy Efficiency (BEE)



New Delhi

 **Legislative Framework:** Energy Conservation Act 2001

 **Objective:** Reduce energy intensity of Indian economy

 **Other Initiatives:** BEE-SME Program for energy efficiency, National Programme on Energy Efficiency and Technology Upgradation, SIDHIEE portal.

 **Reports:** State Energy Efficiency Index (SEEI), 2024 (developed with Alliance for an Energy Efficient Economy)
▷ Maharashtra, Andhra Pradesh, Assam, Tripura are top performers in their respective groups.

4.4. SUSTAINABLE AGRICULTURE

4.4.1. BIO-INPUT RESOURCE CENTRES (BRCS)

Why in the News?

Union Ministry of Agriculture and Farmers' Welfare released **guidelines for setting up of BRCs** under **National Mission on Natural Farming (NMNF)**.

About Bio-Input Resource Centres (BRCS)

- Cluster-level enterprise** where time tested, **locally prepared Inputs/formulations** utilizing **biological entities** are made available for purchase by farmers in a **defined geographical area**.
- In the **Budget Speech 2023-24**, Government had announced setting up of **10,000 BRCs** under NMNF.

Key-features of the Guidelines

- Financial assistance:** Rs 1 lakh for setting up a BRC (Excludes sheds, renting of premises, etc.).
- Who can operate BRCs:** Farmers Practicing Natural Farming (NF), Farmer Producer Organization (FPOs), Self-Help Groups (SHG), Cooperatives, Krishi Vigyan Kendras (KVKs) etc. with Goshalas at Gram Panchayat.

About National Mission on Natural Farming (NMNF)

- Aim:** Promoting NF practices for providing safe & nutritious food for all.
- Type:** Centrally Sponsored Scheme
 - Centre: State share - 90:10 for Hilly & North Eastern States and 60:40 for all other States.**
- Tenure:** Till 2025-26
- Ministry:** Ministry of Agriculture & Farmers' Welfare.
- National Steering Committee (NSC):** At National level, under Chairpersonship of Minister of Agriculture & Farmers' Welfare.
- Key Targets:**
 - 15,000 clusters** in Gram Panchayats, which are willing.
 - Reach **1 crore** farmers and initiate Natural Farming (NF) in **7.5 lakh Ha** area.
 - Around 2000 NF Model Demonstration Farms** shall be established at Krishi Vigyan Kendras (KVKs), Agricultural Universities (AUs) and farmers' fields.

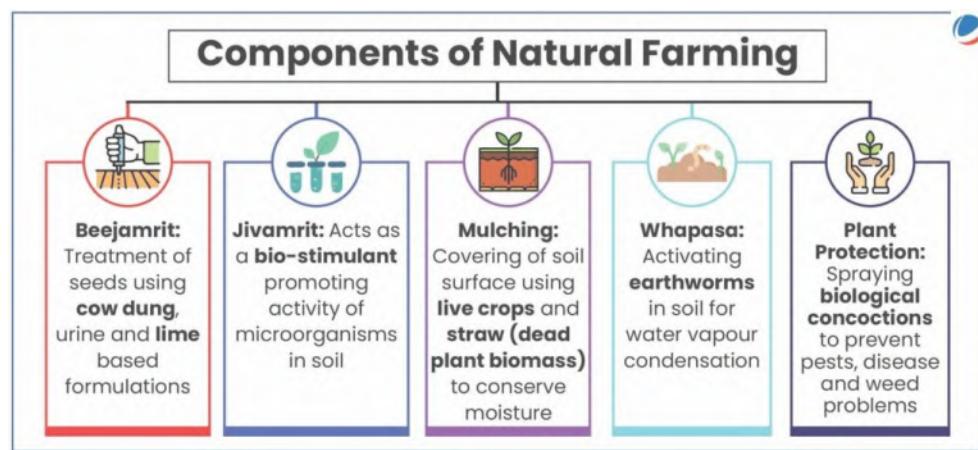
Purposes served by BRCs

- Maintaining and sale of **cultures of bio-fertilizers and bio-pesticides** for multiplication and use by farmers
- Preparation and sale of **ready-to-use organic inputs**
- Training farmers on the preparations of botanical extracts and animal based inputs
- Sharing knowledge on natural farming practices
- Sale of pheromone traps, lures, sticky traps and others

- **30,000 Krishi Sakhis** (Community Resource Persons - CRP) for easy scaling up of NF practices and knowledge.

About Natural Farming

- It is a **chemical free, low-input, climate-resilient farming system** based on livestock and locally available resources while **eliminating synthetic agro-chemicals**.
- States practicing NF are **Andhra Pradesh, Chhattisgarh, Kerala, Gujarat, Himachal Pradesh, Jharkhand, etc.**
- **Benefits of Natural Farming:** Improved Yield; revitalizes soil microbiota, improving soil health; improved agro-biodiversity; judicious water use; smaller carbon and nitrogen footprints; use of bio-inoculums nutrient content and increase bioavailability for humans.



Organic vs. Natural Farming Systems

Similarities: Both are **non-chemical systems of farming** largely relying on biomass management, rejuvenation of natural nutrient recycling, crop rotation and multiple cropping.

Differences:

Parameters	Organic Farming	Natural Farming
Input	Involves off-farm purchased organic and biological inputs.	No external inputs and use on-farm inputs based on Desi Cow.
Soil Correction	Need based soil correction through natural mined minerals.	Use of compost/ vermi compost and minerals are not allowed.
Agro Practices	Requires practices like plowing, tilting, mixing of manures, weeding, etc.	Decomposition of organic matter by microbes and earthworms on soil surface
Cost	More expensive, needs organic manures.	Low cost due to reliance on local biodiversity.

Other Initiatives to promote Natural Farming

- **National Centre for Management of Agriculture Extension (MANAGE):** Knowledge partner for documentation of best practices, digitalization of success stories on Natural Farming.
- **National Centre for Organic and Natural Farming (NCONF):** certification programme for Natural Farming.

4.4.2. GLOBALLY IMPORTANT AGRICULTURAL HERITAGE SYSTEMS (GIAHS)

Why in the news?

Six news sites added to FAO's GIAHS Programme.

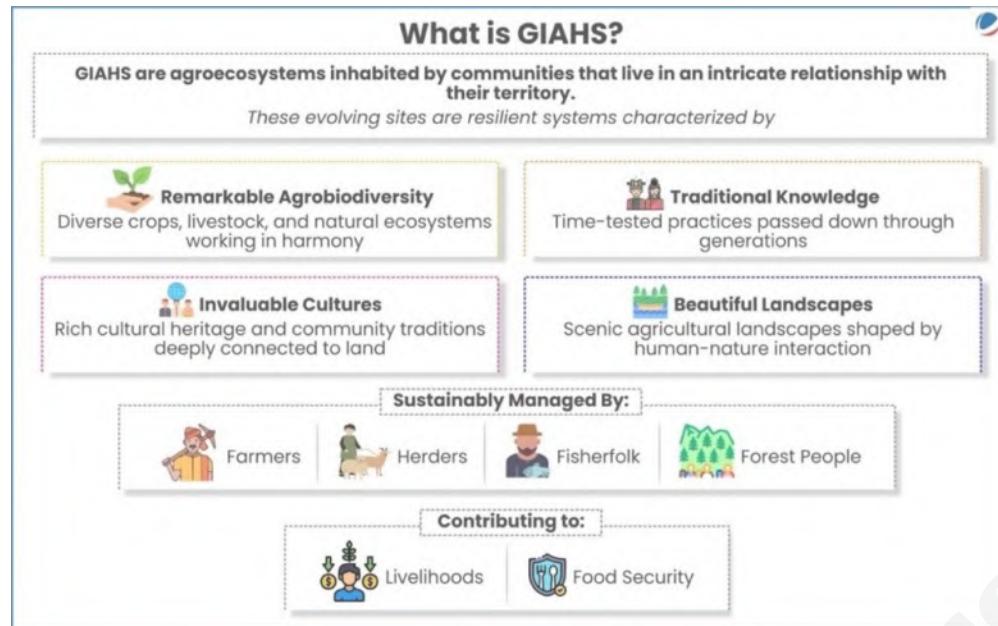
About the Sites Included

- A traditional agroforestry system for **erva-mate plant in Brazil**.
- **Specialised farming systems in China** for pearl mussels (a mollusc), white tea, and pears.
- Ancestral system preserving **vital food crops and biodiversity** in Mexico.

- A distinctive farming system in volcanic landscape of Lanzarote island, Spain.

About Globally Important Agricultural Heritage Systems (GIAHS) Programme

- Genesis:** Launched at World Summit for Sustainable Development in 2002.
- Purpose:** Protect family farming and traditional agricultural systems from threats such as climate change, community displacements and biodiversity loss.
- Current Status:** There are 95 GIAHS sites in 28 countries, including:
 - Saffron Heritage of Kashmir
 - Koraput Traditional Agriculture (in Odisha)
 - Kuttanad Below Sea Level Farming System (in Kerala)



4.4.3. AGROFORESTRY

Why in the news?

Government issued Model Rules 2025 for felling of trees on agricultural land to promote agroforestry.

About Model Rules

- Existing State Level Committee (SLC)** constituted under '**Wood-Based Industries (Establishment & Regulation) Guidelines, 2016**' to oversee the rules.
 - It would also **advise states** on promoting agroforestry by easing tree felling and transit rules.
- Applicants to register in the **National Timber Management System** with land ownership details.
- Felling Permit** issued for agricultural lands with **more than 10 trees**.
- No Objection Certificate** issued for lands with **10 or fewer trees**.

Agroforestry in India

- Defined as **land use system which integrates trees and shrubs** on farmlands and rural landscapes to enhance productivity, profitability, diversity and ecosystem sustainability. (**National Agroforestry Policy 2014**)
- India's agroforestry plantations occupy ~8% of India's geographical land area.
- Significance:** Mitigating climate change through microclimate moderation; carbon sequestration; enhancing productivity; soil fertility and conservation; optimizing use of arable land.

Agroforestry Systems in India	
	Agrisilviculture Combines crops with tree crops
	Agri-horticulture Combines fruit trees with crops
	Agri-silvi-horticulture Combines trees, fruit trees, and crops
	Agri-silvi-pasture Combines trees with cattle on land
	Horti-olericulture Combines fruit trees and vegetables
	Silvi-pasture Integrates livestock, forage, and trees
	Live fence Shrubs and trees forming boundaries
	Silvi- olericulture Combines trees and vegetables
	Horti-pasture Combines fruit trees with pasture or animals

- India's Initiatives for Agroforestry:
 - National Agroforestry Policy in 2014.
 - SubMission on Agroforestry under National Mission for Sustainable Agriculture.
 - Agroforestry component under **Rashtriya Krishi Vikas Yojana**.
 - India joined **Bonn Challenge** pledges to bring into restoration 13 million hectares (mha) of degraded and deforested land by the year 2020.

4.5. MISCELLANEOUS

4.5.1. ENVIRONMENT AUDIT (EA) RULES, 2025

Why in the News?

The Ministry of Environment, Forest and Climate Change (MoEFCC) notified **EA Rules, 2025**.

About Environment Audit (EA)

- Systematic audit, **verification, examination, inspection, or analysis** of any project, activity or process having bearing on environment.
 - EA differs from **EIA**, as the latter is conducted prior to project establishment.
 - Determines extent to which activities **conform to approved Environmental Management Plan (EMP)**.
- **Introduced in 1992** through **Rule 14 of Environment (Protection) Rules in India**.
 - This rule mandates that entities engaged in industries, operations, or processes requiring consent under **Water (Prevention and Control of Pollution) Act, 1974**, **Air (Prevention and Control of Pollution) Act, 1981**, or authorization under **Hazardous Wastes (Management and Handling) Rules, 1989**, must submit an annual environmental statement (Report).
 - > Report is to be submitted to **State Pollution Control Board (SPCB)** each year.

About Environment Audit Rules, 2025

- **Objective:** Formal framework for environmental auditing across the country.
- **Significance:** Third-party audits, aligns with global frameworks (Eco-mark, EPR, ESG, green bonds), etc.
- Developed under **Environment Protection Act (1986)**. Complies with various laws including **Van (Sanrakshan Evar Samvardhan) Adhiniyam (1980)**, **Wildlife Protection Act (1972)**, etc.
- **Environment Audit Designate Agency (EADA):** For certification, registration, oversight, training of EAs.
- **Registered Environment Auditors (EAs):** Undertake Sampling, analysis, compensation calculation, verification under **Green Credit Rules**, audit under **waste management rules** and others etc.
- **Two-Tiered System:**
 - **Tier-1:** Comprises existing government regulator-based review of compliance by agencies like CPCB, SPCBs, and ministry regional offices.
 - **Tier-2:** Environment auditor-based mechanism.
- **Implementation:** Ministry of Environment, Forest and Climate Change
- **Oversight Mechanism:** Steering Committee, led by Additional Secretary from MoEFCC.

4.5.2. ENVIRONMENTAL IMPACT ASSESSMENT (EIA)

Why in the News?

Supreme Court (SC) reviewed and overturned its May 2025 decision in **Vanashakti v. Union of India** which restrained the Centre from granting ex-post facto environmental clearance (EC) to mining projects or regularising actions that contravene the 2006 EIA notification.

About Ex-Post Facto Environmental Clearance

- An ex-post facto EC essentially **allows a project proponent to continue with its project** without obtaining an EC prior to project commencement.

- The Environmental Impact Assessment (EIA) Notification, 2006, clearly requires ‘prior environmental clearance’ before a project can start.
 - Previously, in Common Cause v. UoI & Ors. (2017), Supreme Court held that the concept of ex post facto or retrospective environmental clearance is completely alien to environmental jurisprudence.
- Environmental Clearance (EC) in India**

EC is required in India for projects that can significantly impact the environment.

EIA Notification, 2006
Lists over 39 types of activities (mining, infrastructure, power plants, etc.) that need EC prior to start of a project.

Categorization of Projects

Category A projects: Considered at the Central level in the Ministry of Environment, Forest & Climate Change (MoEF&C).	Category B projects: Handled at the State level by the State/UT Environmental Impact Assessment Authority (SEIAA).
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4.5.3. GREAT NICOBAR ISLAND PROJECT (GNIP)

Why in the News?

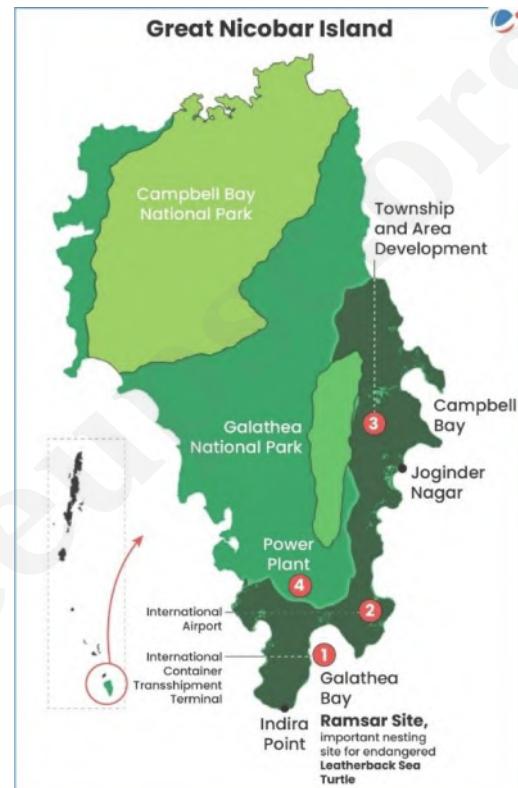
Union Ministry of Tribal Affairs sought factual report from Andaman and Nicobar Islands administration on complaint that **forest rights had not been settled** under Forest Rights Act, 2006 before diverting forest land for GNIP.

Key Points of Contention

- Tribal Councils in the Andaman and Nicobar Islands are **statutory bodies established under Andaman and Nicobar Islands (Tribal Councils) Regulation, 2009.**
 - Have **limited advisory and executive powers**, unlike autonomous councils under Sixth Schedule.
- Andaman and Nicobar Islands administration maintained that it **does not need to implement the FRA**, arguing that tribes were already protected under **Protection of Aboriginal Tribes Act, 1956 (PAT,56)**.
- PAT,56** gives local **administration unilateral authority** to divert forest land, whereas **FRA** mandates **consent to be obtained from Gram Sabhas.**

About Great Nicobar Island Project

- Genesis:** Massive Greenfield infrastructure project conceived by NITI Aayog and approved by Union Cabinet in 2021.
- Nodal Agency:** Andaman and Nicobar Islands Integrated Development Corporation (ANIIDCO), incorporated in 1988 under **Companies Act 1956.**
- Project Components:**
 - International Transshipment Port – Galathea Bay:**
 - A Greenfield international airport**
 - A 450 MW power plant**
 - A modern township**



4.5.4. DAM SAFETY IN INDIA

Why in the News?

IISER Bhopal researchers developed a comprehensive assessment of **sedimentation-induced vulnerabilities** in large reservoirs analysing data from **Central Water Commission’s recent report, ‘Compendium on Sedimentation of Reservoirs in India’.**

Key Findings on Status of Sedimentation:

- Many reservoirs lost nearly 50% of their **designed storage capacity** due to **sedimentation**.
- Regional Variation:** Himalayan Region (HR), West Flowing Rivers, Narmada-Tapi (NT), East Flowing Rivers, and Indo-Gangetic Plains (IGP) emerging as vulnerable regions.
- Consequences:** Sediment starvation, reduced water security, increased energy deficits, etc.

Dams in India

- India is the **3rd largest dam** owning nation after China and USA.
- Around **6000 large dams** are in India (2023), **Maharashtra** has the highest number.
- Largest reservoir in terms of volume:** Indira Sagar Dam on Narmada River in Madhya Pradesh
- Concerns:** >80% of large dams are over 25 years old.

Initiative taken to ensure Dams Safety in India

- Dam Safety Act, 2021:** Institutional framework-
 - National Committee on Dam Safety and National Dam Safety Authority.
 - State Committee on Dam Safety (SCDS) and State Dam Safety Organization (SDSO)
- National Register of Large Dams:** By CWC.
- Dam Rehabilitation and Improvement Project (DRIP):** Phase II and III implemented by Department of Water Resources, River Development and Ganga Rejuvenation through **Central Water Commission (CWC)**, with financial assistance from **World Bank** and **Asian Infrastructure Investment Bank**.
- Seismic hazard analysis information system (SHAISYS) tool**
- Others:**
 - National Centre for Earthquake Safety of Dams (Located at MNIT Jaipur (Rajasthan)),
 - Dam Health and Rehabilitation Monitoring Application (DHARMA), Dam Safety Review Panels by States, etc.

Global steps taken to ensure Dams Safety

- World Commission on Dams:** By World Bank and IUCN in 1998.
- International Commission on Large Dams (ICOLD):** Non-governmental organisation of 1928.
 - Indian National Committee on Large Dams (INCOLD)** undertakes interaction with ICOLD.

4.5.5. SEED MANAGEMENT

Why in the News?

The Department of Agriculture and Farmers Welfare has released the Draft Seeds Bill, 2025.

About Draft Seeds Bill, 2025

- Seeks to replace the **Seeds Act, 1966**, and **Seeds (Control) Order, 1983**.
- Objective:** It will regulate the **quality of seeds** and **planting materials** available in the market.

Key Highlights

- No un-registered seed to be sold**, except farmers' variety and the one produced exclusively for export purposes.
- Mandatory boarding on SATHI portal**- a national portal created by the **Ministry of Agriculture and Farmers' Welfare**, in partnership with National Informatics Centre (NIC) to provide complete traceability of the seeds from the point of origin till they reach the farmer.
- Seed varieties to conform to the **Indian Minimum Seed Certification Standards**.
- Central and State Seed Committees** to be constituted by the Central Government and State Governments, respectively.
- Registration Sub-Committees** to recommend varieties of seeds for registration after scrutinizing their claims.

- **National Register on Seed Varieties**, a register of all varieties of seed kept under the control and management of the Registrar.
- **Protect Farmer's rights** to save, use, exchange, or sell their seeds (like traditional varieties) without needing brand registration, but they can't sell them under a brand name.
- **Establishment of Central and State Seed Testing Laboratories.**

Comparative Analysis of Seeds Act, 1966 and Draft Seeds Bill, 2025		
Aspect	Seeds Act, 1966	Draft Seeds Bill, 2025
Regulatory Scope	Limited to Notified Varieties	Covers all commercially sold seed varieties
Seed Registration	Dependent on government notification and not Mandatory for every variety.	Mandatory registration for every seed variety before trade; old notified varieties are deemed registered.
Quality Assurance Mechanisms	Basic standards for germination and chastity, with limited testing structure.	Stricter quality marks, digital labelling, QR traceability, and expanded accredited laboratories.
Farmer Rights	Limited protections; Farmers had no structured compensation avenue.	Farmers can save, exchange, and sell their seeds.
Market Responsibility	Weak oversight allowed limited seeds to circulate.	Stronger monitoring through enrolment, labelling, and traceability conditions.
Penalty	Fines were low and outdated	Three tier penalty system (Trivial, minor and major).
Technological adaptation	Did not aim to regard hybrids, GM seeds, or biotechnology advancements.	Incorporates biotech norms, regulated seed imports, and oversight mechanisms for modern technologies.

Overview of India's Seed Sector

- 5th largest Seed Industry in the World (the USA has the largest industry).
- Seed exports amount to USD 150 million within a global export market valued at USD 15 billion (less than 1%) in 2023-24.
- The **seed programme** follows the **limited generations' system for seed multiplication** in a **phased manner**.
- Recognizes **three generations of seeds**-
 - **Breeder Seed**: Progeny of the **nucleus seed of a variety** and is produced by the originating breeder or by a sponsored breeder.
 - > **ICAR promotes sponsored breeder seed production programme** through National Seeds Corporation/State Farms Corporation of India, Krishi Vigyan Kendras etc.
 - **Foundation Seed**: Progeny of breeder seed.
 - > Production of foundation seed has been entrusted to the NSC, SFCI, State Seeds Corporation, State Departments of Agriculture and private seed producers.
 - **Certified Seed**: It is the progeny of foundation seed.

Key Initiatives Taken

- **National Seeds Policy, 2002**: Emphasizes seed production, quality assurance and seed distribution and marketing, etc.
- **Protection of Plant Varieties and Farmers' Rights Act, 2001**: Provides for the establishment of an effective system for the protection of plant varieties, rights of farmers and plant breeders, and encourages the development of new varieties of plants.
- **Seed Village Programme (Beej Gram Yojana)**: Improve farmers saved seed quality.
- **National Seed Reserve**: To ensure seed availability during climatic disruptions.
- **Odisha launched a Roadmap to integrate Landraces, into formal seed systems.**

- Landraces are **genetically diverse crop populations**, evolved with traditional farmer practices through a **combination of natural adaptation and human selection**.
- **Other:** National Seeds Project Phase-III (NSP-III), Seed Management 2.0 system, etc.

4.5.6. SAND MINING

Why in the news?

Supreme Court (**SC**) observed that **replenishment data is a mandatory prerequisite for environmental clearance** in addition to **District Survey Report ("DSR")**.

Key highlights of SC Observations

- **Essentiality of Replenishment Study:** Absence of this renders a DSR fundamentally defective.
- **Natural Regeneration Principle:** Just as trees must regrow before felling, sand mining requires a **recharge study** to ensure rivers remain balanced.

About Sand Mining

- **Removal of natural sand and related resources** like minerals and stones from riverbeds, land, or other environments for use in construction and processing.
- **Environmental Implications of unrestricted sand-mining:** Riverbank erosion; lowering of groundwater tables; threats to biodiversity; increase flood risks; declining water quality with higher turbidity levels, etc.

Existing Legal Framework for Sand Mining in India

- **Environment (Protection) Act, 1986**
- **Deepak Kumar vs State of Haryana (2012):** SC made **environmental clearance** mandatory for all minor mineral extractions, including sand.
- **EIA Notification (2016 Amendment):** Cluster-based assessments and making replenishment studies a key part of District Survey Report
- **Sustainable Sand Mining Management Guidelines, 2016 and Enforcement & Monitoring Guidelines, 2020:** Calculation of **annual replenishment rate** to determine safe, sustainable mining limits.

4.6. OTHER IMPORTANT NEWS

News	Details
BRICS Land Restoration Partnership	It was launched at 15th BRICS Agriculture Meet in Brazil. <ul style="list-style-type: none">● Address land degradation, desertification and soil fertility loss, and benefit small farmers, tribals, etc.● Need/Relevance: High rate of land degradation. E.g. In India, ~32 % of land is degraded, and 25 % is undergoing desertification (Food and Agriculture Organization (FAO)).
UN-India Global Capacity-Building Initiative	India launched projects with UN under Global Capacity Building Initiative for Asia, Africa and Caribbean countries. <ul style="list-style-type: none">● Genesis: India and United Nations jointly launched it in September 2023● Objective: Share India's development experiences, best practices, and expertise with Global South nations for accelerating progress on Sustainable Development Goals (SDGs).● Implemented through new UN India SDG Country Fund and Indian Technical and Economic Cooperation Programme (ITEC).
RECLAIM Framework	Coal Controller Organisation under Coal Ministry and Heartfulness Institute launched RECLAIM framework. <ul style="list-style-type: none">● Objective: Structured guide for inclusive community engagement and development throughout the mine closure and post-closure phases.<ul style="list-style-type: none">○ Recognizes that mine closures significantly impact both landscapes and local livelihoods.

	<ul style="list-style-type: none"> Special emphasis on gender inclusivity, representation of vulnerable groups, and alignment with Panchayati Raj Institutions. <div style="text-align: center;"> <pre> graph TD REACHOUT[REACH OUT] --> COMMUNITY[Understand the Community] ENVISION[ENVISION] --> FUTURE[Dream & Define the Future] CODESIGN[CO DESIGN] --> STRATEGICALLY[Plan Together Strategically] LOCALISE[LOCALISE] --> REALITIES[Adapt to Ground Realities] ACT[ACT] --> PARTICIPATION[Implement with Participation] INTEGRATE[INTEGRATE] --> SYSTEMS[Ensure Sustainability Through Systems] MAINTAIN[MAINTAIN] --> LEADERSHIP[Sustain through localized leadership] </pre> </div>
L.I.V.E.S. and ARTHA	<p>Unveiled at Star Rating Award Ceremony for Coal and Lignite Mines.</p> <ul style="list-style-type: none"> L.I.V.E.S is a comprehensive practitioner's guide to serve as benchmark for responsible and sustainable mine closures in alignment with global best practices. ARTHA is a Green Financing Framework for channeling investments towards transforming reclaimed mines into productive and environmentally friendly assets.
Uniform Renewable Energy Tariff (URET)	<p>Scrapped by Ministry of Power.</p> <ul style="list-style-type: none"> Aims to provide uniform tariff to consumers by averaging competitive bid tariffs of similar renewable energy projects within central pools. Address potential impacts on procurers resulting from declining bid-discovered prices. Reasons for revocation <ul style="list-style-type: none"> Procurers were reluctant to sign Power Sale Agreements due to uncertainty of tariffs over the three-year fixed period causing stalled projects. Facilitate transparent price discovery between producers and consumers and speed up renewable energy deployment across the country.
UNDP Equator Initiative Award	<p>Bibi Fatima Women's self-help group (SHG) from a small village in Dharwad district was one of the winners of the 'Equator Initiative Award', also referred to as Nobel Prize for Biodiversity Conservation.</p> <ul style="list-style-type: none"> Presented biennially under Equator Initiative of United Nations Development Programme (UNDP). The initiative provides opportunities for Indigenous Peoples and local communities to address land degradation, biodiversity conservation and livelihood improvement. The SHG introduced millet-based mixed cropping on rainfed farms, promoted climate-resilient farming systems, practised livestock rearing and horticulture and popularised millets.
Sustainable Energy for All (SEfor ALL)	<p>NTPC ties up with SEforALL for energy transition roadmap.</p> <ul style="list-style-type: none"> Launched by former UN Secretary-General Ban Ki-moon in 2011. <ul style="list-style-type: none"> It is an independent organization, hosted by UNOPS. Global mandate: Accelerate progress on energy transition in emerging and developing countries. About UN office for Project Services (UNOPS): <ul style="list-style-type: none"> Now a separate, self-financing UN Agency which was part of UNDP until 1994. Headquarter: Copenhagen, Denmark Objective: Helps implement humanitarian and development projects,

	focusing on sustainable development and Sustainable Development Goals.
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4.7. TERMS/CONCEPTS IN NEWS

4.7.1. RENEWABLE PURCHASE OBLIGATION (RPO) AND RENEWABLE CONSUMPTION OBLIGATION (RCO)

Ministry of Power issued a revised draft notification on RCO under Energy Conservation Act (ECA) 2001 establishing **mandatory year-wise Renewable Energy (RE) consumption targets** from 2024-25 to 2029-30.

About RPO and RCO

- RPO, established under **Electricity Act, 2003**, mandates electricity distribution companies, captive power producers and open-access consumers to **annually purchase a certain minimum amount of RE** out of their total procurement.
- While RPO focuses on actual purchase of electricity from RE sources, RCO focuses on **actual consumption from RE sources** by designated consumer.
 - Through above notification, government is **moving towards RCO from present Renewable Purchase Obligation (RPO)** to boost consumption of RE.
 - Draft specifies RCO – **minimum share** of electrical energy **consumption from RE sources** – for electricity distribution licensees, open access consumers and captive users.
 - Creates **binding obligations** with **penalties for non-compliance** overseen by **Bureau of Energy Efficiency (BEE)**.

4.7.2. SUSTAINABLE AVIATION FUEL (SAF)

Indian Oil signed a MoU with Air India for supply of sustainable aviation fuel.

About Sustainable Aviation Fuel (SAF)

- An **alternative fuel made from non-petroleum feedstocks** that reduces emissions from air transportation.
- Can be blended up to **50% in conventional aviation turbine fuel** (ATF or jet fuel), depending on availability.
- India mandated **1% SAF blending in jet fuel** sold to international airlines from 2027.
- **Raw material:** Corn grain, Oil seeds, Algae, Other fats, oils, and greases, Agricultural residues, Forestry residues, Wood mill waste; Wastewater treatment sludge etc.

4.7.3. GREEN MUNICIPAL BONDS (GMB)

Recently, Ghaziabad Nagar Nigam pioneered India's first certified GMB issued under Swachh Bharat Mission-Urban, raising ₹150 crore for development of Tertiary Sewage Treatment Plant (TSTP).

- TSTP was developed under **Public-Private Hybrid Annuity Model (PPP-HAM)**, with **40% municipal funding**.

About GMB

- **Municipal bonds** refer to **non-convertible debt securities** issued by municipal body or others established for such purposes and entrusted with functions under **Article 243W** of Constitution.
- **Green bonds** are used to raise funds **specifically for climate mitigation, adaptation and other environment friendly and low carbon projects (World Bank)**.

4.7.4. GAS HYDRATES

China is constructing the **world's first permanent undersea research station** to study gas hydrates, potential energy source larger than Persian Gulf's oil reserves.

About Gas Hydrates

- **Crystalline solids composed of water and gas**, containing large amounts of methane.
- Classified as **unconventional hydrocarbons** because extracting them requires **advanced and non-traditional technologies**.
- Exists in huge quantities in marine sediments in a layer several hundred meters thick directly below **sea floor**. Also found within **permafrost** layer in Arctic.
- In India: Huge quantities around the **Andaman Islands** and in **Krishna-Godavari** offshore.

4.8. ORGANIZATIONS IN NEWS

4.8.1. INTERNATIONAL ENERGY AGENCY



International Energy Agency



Paris, France

Genesis: Founded in **1974** to ensure the security of oil supplies.

Membership: **32 Member** countries and 13 Association countries [**India is an associate member**].

- To be a member, a country must be a member of OECD along with other requirements like-
 - Accessible Crude oil and/or product reserves **equivalent to 90 days of previous year's net imports**;
 - **Demand restraint programme** to reduce national oil consumption by up to 10% etc.

Mission: Work with governments and industry to shape a secure and sustainable energy future for all.

Flagship Publications: World Energy Outlook.

Recent Reports	Details
Global Methane Tracker 2025	► Methane is responsible for around 30 % rise in global temperatures since the Industrial Revolution.
Delivering Sustainable Fuels: Pathways to 2035	► Sustainable fuels have reduced global oil demand by around 2.5 million barrels per day in 2024.
Global EV Outlook, 2025	► Over 1 in 4 cars sold globally in 2024 was electric, China leads with nearly 50% global EV car sales; India leads global growth in electric 3-Wheelers.

4.8.2. INTERNATIONAL CROPS RESEARCH INSTITUTE FOR THE SEMI-ARID TROPICS (ICRISAT)



International Crop Research Institute for the Semi - Arid Tropics



Genesis: Established as a Non-profit research centre under the CGIAR consortium in 1970s.

- ▶ **CGIAR is a global research group** for achieving **food security and sustainable agriculture**.



Purpose: Improve **food security in semi-arid regions** and **support smallholder farmers in drylands**.



Global Footprint: **Asia, Sub-Saharan Africa, and other dryland** regions globally.



Achievements: Awarded **Africa Food Prize in 2021**, Developed **world's first pigeon pea hybrid**.



Recent Initiative: ICRISAT, in collaboration with **Research and Information System for Developing Countries (RIS)**, launched the ICRISAT **Centre of Excellence for South-South Cooperation**.

4.8.3. SOLAR ENERGY CORPORATION OF INDIA (SECI)



Solar Energy Corporation of India



Genesis: Established in 2011 for implementation of the National Solar Mission.



About: Navratna Central Public Sector Undertaking under **Ministry of New and Renewable Energy**.

- ▶ Designated Renewable Energy Implementing Agency (REIA) for MNRE schemes.

- ▶ Functions as **Category-I (highest) power trading licensee** under **Central Electricity Regulatory Commission (CERC)**.



Implementation of Special Programmes and Regional Models: Greening of Islands (e.g., Lakshadweep, A&N Islands), High-altitude grid-linked capacity (e.g., 5 GW proposed in Ladakh).



Recent Achievements: SECI executed over **60 Gigawatts of Power Sale Agreements (PSAs)** of renewable energy capacity.

4.9. RELATED REPORTS/INDICES IN NEWS

Report/Indices	Detail
Production Gap Report 2025	Released by: Stockholm Environment Institute, Climate Analytics, and International Institute for Sustainable Development. <ul style="list-style-type: none">● Production Gap: Discrepancy between governments' planned or projected fossil fuel production and global production levels consistent with limiting warming to 1.5°C or 2°C.● Planned fossil fuel production in 2030 will exceed levels consistent with limiting warming to 1.5°C by more than 120% and to 2°C by 77%.
Global Electricity Mid-Year Insights 2025	Released by: Energy think tank Ember
The State of Food and Agriculture (SOFA) 2025 Report	Released by: Food and Agriculture Organization (FAO)

5. DISASTER MANAGEMENT

5.1. INTERNATIONAL CONFERENCE ON DISASTER RESILIENT INFRASTRUCTURE 2025

Why in the News?

Recently, African Union joined India's Coalition for Disaster Resilient Infrastructure (CDRI) as 54th Member, at 7th International Conference on Disaster Resilient Infrastructure (ICDRI) in France.

About ICDRI 2025

- It launched a call to action for coastal resilience in SIDS (Small Island Developing States) highlighting 10 concrete actions to unlock finance including launch of **SIDS Global Data Hub 2.0**, etc.



- ICDRI is a platform under CDRI driving discussions/actions on **climate adaptation, coastal resilience, etc.**
- It is the first time the conference is held in Europe (**co-hosted by CDRI and France**).
- Theme:** Shaping a Resilient Future for Coastal Regions.



Coalition for Disaster Resilient Infrastructure

New Delhi

Launched: At United Nations Climate Action Summit in 2019 by India.

▷ Global partnership of **national governments, UN agencies, multilateral development banks** and private sector.

Objective: Promote the resilience of infrastructure systems to climate and disaster risks.

Members: 56 members

Reports: Global Infrastructure Resilience Report

Governing Council: Co-chaired by representatives of two national governments, with India being permanent co-chair.

Initiatives

▷ **Infrastructure for Resilient Island States (IRIS):** For SIDS.

▷ **Infrastructure Resilience Accelerator Fund:** Established with UNDP and UNDRR.

Indian Initiatives for Mitigating Coastal Vulnerabilities

- Coastal Regulation Zone (CRZ) Notification (2019)**
- Integrated Coastal Zone Management Project (ICZMP):** In states like Odisha and West Bengal.
- Coastal Vulnerability Index (CVI):** By Indian National Centre for Ocean Information Services (INCOIS).
- Multi-Hazard Vulnerability Maps:** Developed by INCOIS.

5.2. DISASTER RISK REDUCTION (DRR) FINANCING

Why in the News?

United Nations Office for Disaster Risk Reduction (UNDRR) released the **Global Assessment Report (GAR)** titled “**Resilience Pays: Financing and Investing for our Future**”.

India's Disaster Risk Reduction (DRR) Financing System

- **DRR Finance Mechanism:** India follows **pre-determined, rule-based allocations** from **national to state and district levels**, supported by **Disaster Management Act of 2005**.
- **Current Allocations:** Under **15th Finance Commission**, it exceeds INR 2.32 trillion (~USD 28 billion).
- **New Methodology:** 15th Finance Commission's new methodology for state-wise allocations, replaces the earlier expenditure driven methodology.
 - It combines **capacity, risk exposure** and **proneness to hazard & vulnerability** (Disaster Risk Index).
- **Disaster Mitigation Funds:** 15th Finance Commission recommended **creation of National Disaster Mitigation Fund (NDMF) and State Disaster Mitigation Fund (SDMF)**.
 - Centre contributes 75% for all States (90% for North-Eastern/Himalayan States) in SDMF.
- **Global Leadership:** India showcased **World's Largest Disaster Risk Reduction Financing System** at 8th session of **Global Platform for Disaster Risk Reduction (GPDRR, 2025)**.
 - **GPDRR** was established in **2006** to assess implementation of **Sendai Framework for DRR (2015-30)**.
 - **Sendai Framework** is successor to **Hyogo Framework for Action (HFA) 2005-2015**, adopted at 3rd United Nations Conference on DRR (2015), in Sendai Japan.



5.3. C-FLOOD

Why in the News?

Recently inaugurated by Union Minister of Jal Shakti.

About C-FLOOD

- **A Web-based platform** providing **2-day advance flood inundation forecasts** up to **village-level**.
 - Uses advanced 2-D hydrodynamic modelling.
 - Offers **flood inundation maps** and **water level predictions** to aid **disaster preparedness**.
- **Significance:** Unified system integrating flood modelling outputs from **national and regional agencies**.
- **Jointly developed by:**
 - Centre for Development of Advanced Computing (C-DAC), Pune.
 - Central Water Commission (CWC)
 - Department of Water Resources, River Development & Ganga Rejuvenation, Ministry of Jal Shakti.
 - National Remote Sensing Centre (NRSC)



- Execution: Under National Supercomputing Mission (NSM)
 - NSM (2015) aims to empower India's supercomputing capabilities.
 - Jointly steered by Ministry of Electronics and Information Technology (MeitY) and Department of Science and Technology (DST).
- Present Coverage: Mahanadi, Godavari, and Tapi river basins. Planned to expand to cover all river basins across India.
- Forecasts to be integrated with National Disaster Management Emergency Response Portal (NDEM).

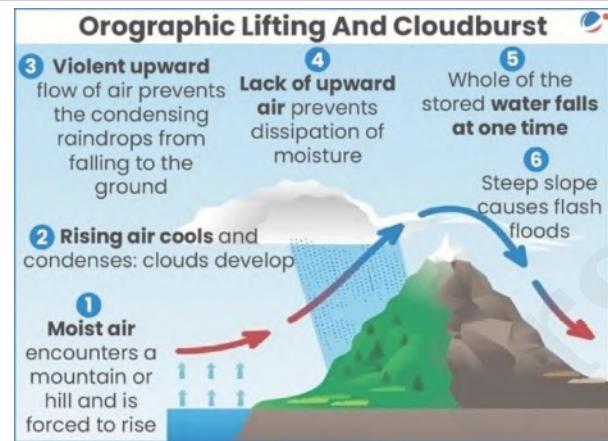
5.4. CLOUDBURSTS

Why in the news?

A cloudburst over the Kheer Ganga River (a tributary of Alaknanda River) led to flash floods in Uttarkashi district.

About Cloudburst

- Extreme precipitation in a short period, sometimes accompanied by hail/thunder, creating flood conditions.
 - Occurs in plains as well, but more common in mountainous zones, due to orographic lift. (see infographic)
- India Meteorological Department (IMD) terms a rain event as cloud burst if 10 cm rainfall is received at a station in one hour.
- Recent Examples: Kishtwar district, J&K; Chamoli and Dharali, Uttarakhand and Himachal Pradesh.
- Challenges with Tackling: Climate Change (E.g., every 1°C rise lets air hold ~7% more moisture); Forecasting Challenges (Satellites lack precision, etc.).
- Measures: Cloudburst Disaster Risk Reduction (DRR) Strategy – National Disaster Management Plan (2019) including Landslide Hazard Zonation (LHZ); etc.



5.5. GLACIAL LAKES AND GLACIAL LAKES OUTBURST FLOODS (GLOFs)

Why in the News?

Central Water Commission (CWC) report provides insights on GLOFs.

Key Highlights

- Out of 100 glacial lakes over 10 hectares in size, there was an increasing trend in water spread area in 34, a decreasing trend in 20, a "no change trend" in 44.

About Glacial Lake and Glacial Lake outburst flood (GLOFs)

- Glacial lakes: Water formed by melting glaciers, usually at or near glacier's base.
 - The Indian Himalayan Region (IHR) is home to 11 river basins and 28,000 glacial lakes.
 - Two primary types of glacial lakes:
 - Supraglacial lakes: Formed by meltwater in depressions on glaciers, prone to summer melting.
 - Moraine-dammed lakes: Formed by meltwater at glacier toes, dammed by loose debris or ice cores, prone to sudden failure.
- GLOFs: Flood resulting from sudden and rapid release of water from a glacial lake, often caused by failure of a moraine dam or ice dam. E.g. 2023 South Lhonak GLOF that damaged Teesta III Dam in Sikkim.
- Major Causes of GLOFs: Glacial Surging (rapid short term advance of a glacier); Moraine Dam Failure; Seismic Activities; Human activities, etc.

India's Mitigation Strategy

- NDMA, through its Committee on Disaster Risk Reduction (CoDRR) deals with risk reduction.

- **National Glacial Lake Outburst Flood (GLOF) Risk Mitigation Project (NGRMP):** In Arunachal Pradesh, Himachal Pradesh, Sikkim and Uttarakhand.
- **Central Water Commission (CWC):** Monitors 902 glacial lakes and water bodies in the Himalayas.
 - 90 GLOF project-based studies approved under **National GLOF Risk Mitigation Program (2021-2026)**.
- **Synthetic Aperture Radar** imagery to automatically detect changes in glacial lake size.

5.6. TSUNAMI

Why in the News?

An 8.8 magnitude Earthquake struck **Russia's Kamchatka Peninsula** triggering **tsunami waves near Kuril Islands** in Pacific Ocean.

About Tsunami

- **Series of extremely long waves** caused by large and **sudden displacement of ocean**, usually result of an earthquake below or near ocean floor e.g. **Indian Ocean Tsunami (2004)**.
- **Causes:** Earthquakes, landslides, volcanic eruptions, meteorites, underwater explosions (including nuclear).
- Frequently observed along **Pacific Ring of fire**, belt of **active/dormant volcanoes** surrounding Pacific Ocean.

Characteristics of Tsunami Waves:

- **Wavelength:** Speed & wavelength primarily depends on ocean depth, not distance from wave's source.
 - **Wavelength** in deep ocean is ~200 km and **reduces to less than 20 km** near coast **due to shoaling**.
- **Wave Height (Amplitude):** Not noticed by ships in deep oceans because their amplitude is negligible.
 - When it approach shallow water, **wave amplitude increases**.

NDMA Guidelines for Tsunami

- **Mandate a multi-tiered institutional structure** (NDMA, SDMAs, DDMAs).
- **Developing early warning systems**, Doing hazard and vulnerability assessment
- **Mitigation measures** e.g. Developing Natural buffers like bio shields, mangrove regeneration etc.

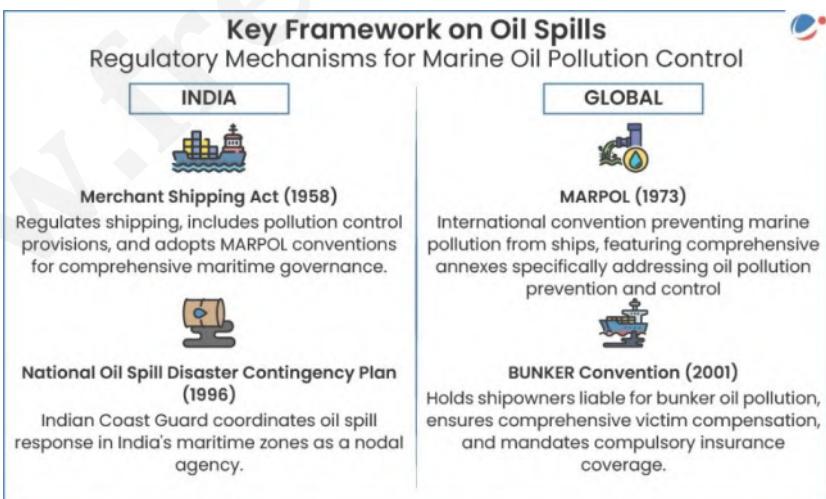
5.7. OIL SPILL

Why in the news?

Kerala declared emergency after container ship carrying Calcium Carbide capsized near its coast.

About Calcium Carbide

- A hazardous chemical that reacts violently with seawater to produce highly flammable **acetylene gas**.
- Use of calcium carbide for ripening fruits has been **banned** under **Food Safety and Standards (Prohibition and Restrictions on Sales) Regulations, 2011**.



About oil spill

- **Source:** Crude oil, diesel, petroleum, etc. from tankers, offshore platforms, drilling rigs or wells, etc.
- **Impact:** **Poisons algae**, disrupting food chains & reduce edible crustacean yield; **Contamination of commercially valuable fish flesh; Affect benthic organisms**. E.g., clams and mussels.

Key Technologies to Clean Oil Spills

- **Bioremediation:** E.g., Oilzapper & Oilivorous-S, developed by The Energy and Resources Institute (TERI); use bacteria to convert harmful hydrocarbons into harmless carbon dioxide and water.
- **Sorbents:** E.g., Milkweed plant's fiber, commonly found in Rajasthan, can be effectively used as a sorbent material.
- **Oil Boom:** Involves using large floating booms with skirts extending into the water to physically isolate the spill area.
- **Skimmers:** These machines scrape oil from the water surface. They first concentrate the oil and later skim it efficiently.

5.8. OTHER IMPORTANT NEWS

News	Details
National Crisis Management Committee (NCMC)	<p>Ministry of Home Affairs Notified Disaster Management NCMC (Procedure) Rules, 2025.</p> <ul style="list-style-type: none">• Background: Disaster Management Act (Amendment) Act, 2025, granted statutory status to NCMC.• Composition: Headed by Cabinet Secretary, with members including Home, Defence Secretary, etc.• Powers and Functions: Nodal body to deal with major disasters, evaluate preparedness, etc.• Mandate: To lay down the policies, plans and guidelines for Disaster Management.
Winter Fog Experiment (WiFEX)	<p>One of the world's few long-term open-field experiments focused solely on fog.</p> <ul style="list-style-type: none">• Institutions: Led by Indian Institute of Tropical Meteorology under the Ministry of Earth Sciences (MoES).• Objective: To develop better now-casting (next 6 hours) and forecasting of winter fog.
Regional Integrated Multi-Hazard Early Warning System (RIMES)	<p>Declaration on Disaster Preparedness adopted at 4th Ministerial Conference of RIMES, held in Colombo, Sri Lanka.</p> <ul style="list-style-type: none">• Intergovernmental body that provides early warning services, disaster risk reduction strategies, and capacity building to Member States.<ul style="list-style-type: none">◦ Evolved post 2004 Indian Ocean tsunami.• Membership: 22 member states and 26 collaborating states.• Operates from its regional early warning centre at Asian Institute of Technology in Thailand.
LICOMK++ Ocean Simulator	<p>Chinese researchers have developed a high-resolution ocean simulation system, named LICOMK++, offering enhanced capabilities for modelling ocean dynamics and climate patterns.</p> <ul style="list-style-type: none">• Hailed as an ocean "microscope" due to its ultra-high-resolution capabilities.• Enables scientists to analyze complex processes like eddies and heat transport with clarity.• Can improve predictions for extreme weather events like typhoons, marine heatwaves.
Weather Derivatives (WD)	<p>India is to launch its first WD, with National Commodity and Derivatives Exchange Ltd (NCDEX) partnering with India Meteorological Department (IMD) to develop rainfall-based derivative products.</p> <ul style="list-style-type: none">• It will help farmers and allied sectors hedge against risks like irregular rainfall, heatwaves, etc.• Using historical and real-time weather data from IMD, offers location-specific, seasonal contracts backed by statistically verified datasets.• Unlike traditional derivatives based on financial assets, WD utilise meteorological parameters, like rainfall and temperature, as underlying asset, tied to a predefined weather index.• As they have no inherent market value, WD are considered part of an incomplete market.

	<ul style="list-style-type: none"> Globally, over-the-counter trading in such products began in 1990s. 								
SACHET (India's SMS-Based Alert System)	<ul style="list-style-type: none"> Operationalized by: National Disaster Management Authority (NDMA) <ul style="list-style-type: none"> NDMA headed by Prime Minister, is the apex body for Disaster Management in India established under Disaster Management Act, 2005. Developed by Centre of Development of Telematics C-DOT using the Common Alerting Protocol (CAP), recommended by the International Telecommunication Union (ITU). Active in 36 States/UTs, Sends geo-targeted SMS alerts during disasters like cyclones, floods, etc. 								
Cell Broadcast (Near Real-Time Emergency Alerts)	<p>Being developed by C-DOT, CB alerts are broadcast directly to all mobile phones in affected area.</p> <ul style="list-style-type: none"> Much faster than SMS—ideal for urgent disasters like tsunamis, earthquakes, lightning, etc. 								
Early Warnings for All (EW4All)	<ul style="list-style-type: none"> Aim: Ensure universal protection from hazardous hydrometeorological, climatological and related environmental events through life-saving multi-hazard early warning systems by 2027. Launched: At COP27 of UNFCCC in 2022 by the UN Secretary-General. Organizations: Jointly led by WMO, UNDRR, ITU and IFRC. Coverage: Initially focused on 30 high-risk countries, has expanded to >100 participating nations. <div style="text-align: center;"> <p>4 Pillars of EW4All</p> <table border="1"> <thead> <tr> <th></th> <th></th> <th></th> <th></th> </tr> </thead> <tbody> <tr> <td>Disaster Risk Knowledge Led by: UN Office for Disaster Risk Reduction.</td> <td>Detection, Observation, Monitoring, Analysis & Forecasting Led by: World Meteorological Organization.</td> <td>Warning Dissemination & Communication Led By: International Telecommunication Union</td> <td>Preparedness & Response Capabilities Led By: International Federation of Red Cross and Red Crescent Societies.</td> </tr> </tbody> </table> </div>					Disaster Risk Knowledge Led by: UN Office for Disaster Risk Reduction.	Detection, Observation, Monitoring, Analysis & Forecasting Led by: World Meteorological Organization.	Warning Dissemination & Communication Led By: International Telecommunication Union	Preparedness & Response Capabilities Led By: International Federation of Red Cross and Red Crescent Societies.
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5.9. TERMS/CONCEPTS IN NEWS

5.9.1. TWISTER

- Violently spinning (250 Miles/Hr), funnel-shaped columns of air stretching from dark thunderclouds to ground.**
- Recent Occurrence:** USA
- Formation:** Develop **when moist and warm air collides with dry and cold air, creating atmospheric instability** and strong updrafts within thunderstorm.
 - Resulting wind shear causes air to spin, and if this rotation is tilted vertically and intensifies, a tornado (or twister) forms.
 - Majority are formed around **Gulf of Mexico**, acting as **large source of moisture**.

5.9.2. GREY RHINO EVENT

- Defined as **highly probable, high impact but yet neglected** systemic disruptions.
 - These are **not random surprises** (like Black Swan events) but **occur after clear warnings and accumulating evidence**.
- Recent Occurrence:** Wayanad landslide

5.9.3. SUPER TYPHOON

- Tropical cyclone with maximum wind speed exceeding 185 kph or more than 100 knots.**
 - Tropical cyclones are **warm-core low pressure systems** associated with spiral inflow at bottom level and spiral outflow at top.

- Always form over oceans where **sea surface temperature is greater than 26°C.**
- Develop at **latitudes usually greater than 5°** from equator in the presence of Coriolis force.
- **Recent Occurrences:** Cyclone Montha (Bay of Bengal); Typhoon Matmo (China), etc.
- **Recent Occurrence:** Super Typhoon, Ragasa in Philippines.
- **Terms for Tropical Cyclones:**
 - **Hurricane** – North Atlantic, Eastern North Pacific and South Pacific Ocean.
 - **Cyclone** – Indian Ocean.
 - **Typhoon** – Western North Pacific Ocean.
 - **Willy-willy**: Eastern part of the Southern Indian Ocean.

5.9.4. EARTHQUAKE SWARM

- Sequences of many earthquakes that occur in a relatively short period without a specific main shock.
- Recent Occurrence: Iceland due to Lava eruption
- Swarms can **last weeks and produce many thousands of earthquakes.**
- Observed in **volcanic environments, hydrothermal systems, and other active geothermal areas.**

5.9.5. SWELL WAVES

- **Long-wavelength ocean waves** travelling long distances away from their origin.
- They are generated mainly by **windstorms / strong air currents.**
- **Largely unaffected by local winds** and often go undetected by satellites due to low frequency and lack of surface whitecaps.
- Also called **Kallakkadal waves in India**. (Termed approved for scientific use by UNESCO).

5.9.6. BLOWOUT

- **Oil/gas well accident** where underground pressure forces gas/oil to surface uncontrollably.
 - On its way out, gas **mixes with drilling fluid, sand**, and sometimes **oil** and shoots out at surface in an **uncontrolled jet**.
- **Caused by valve failure or underestimating pressure**, leading to sudden release of flammable materials.

5.9.7. MESOSCALE CONVECTIVE SYSTEM (MCS)

- **Collection of thunderstorms that act as a system.** Can spread across entire state and last **>12 hours.**
- Bring intense rainfall, **causing** damage to lives, livestock and infrastructure.
- **Hotspots:** West and Central Africa, **northern India**, Argentina, China and US Great Plains.

5.10. ORGANISATION IN NEWS

5.10.1. INDIAN NATIONAL CENTRE FOR OCEAN INFORMATION SERVICES (INCOIS)



Indian National Centre for Ocean Information Services (INCOIS)



Genesis: Established as an autonomous body in 1999 under **Ministry of Earth Sciences (MoES)**.

▷ Unit of the **Earth System Science Organization (ESSO)**.



Mandate: Provide ocean information and advisory services to society, industry, government agencies and scientific community through **sustained ocean observations** and **constant improvements** through **research**.



Other INCOIS Services: Potential Fishing Zone (PFZ) Advisory, Tsunami Early Warning System, Ocean State Forecast (OSF), Coral Bleaching Alerts System etc.

5.11. RELATED REPORTS/INDICES IN NEWS

Report/Indices	Detail
Global Drought Outlook, 2025	Released by: Organisation for Economic Co-operation and Development (OECD).
Disaster Risk Index (DRI)	<p>Chief Minister of Himachal Pradesh urged 16th Finance Commission to reframe Disaster Risk Index (DRI) to reflect the unique vulnerabilities of hill states.</p> <ul style="list-style-type: none"> Measurement Tool: Composite measure that quantifies level of risk a region faces from multiple hazards and used as a metric in disaster risk financing. It is designed to: <ul style="list-style-type: none"> assess the likelihood and potential severity of disasters, capture vulnerability and exposure levels, support evidence-based decision-making, and guide resource allocation for disaster mitigation and preparedness. Genesis: 15th Finance Commission (2021–26) formally adopted it to guide disaster funding. It integrated state's DRI score into a formula for distributing NDRF and state contingency funds. Components: DRI uses probability of hazards (score of 70) and vulnerability (score of 30) to arrive at a composite score.
District Flood Severity Index	Developed by: Researchers from IIT Delhi and Gandhinagar <ul style="list-style-type: none"> Designed to quantify flood severity at the district level. Composite DFSI consists of six factors classified in two groups: <ul style="list-style-type: none"> Variables representing occurrence of floods: Number of flood events, mean flood duration, flooded area, and population. Variables representing damage due to floods: Human fatality and humans injured in a district.

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6. GEOGRAPHY

6.1. GLOBAL GEOPARKS NETWORK (GGN)

Why in the news?

During the 10th Anniversary of **UNESCO Global Geoparks (UGGPs)**, 16 new sites across 11 countries were added to the GGN.

About GGN

- GGN is a **non-profit International Association founded under UNESCO**, which establishes ethical standards to be adopted by Global Geoparks.
- **Major Geoparks added to GGN:** Kanbula (China); Mt Paektu (North Korea); North Riyadh (Saudi Arabia)

About UNESCO Global Geoparks (UGGP)

- **Genesis:** Introduced in 2015 as a key component of the **International Geosciences and Geoparks Programme (IGGP)**.
- **Geoparks:** Single, unified geographical areas where landscapes of international geological significance are managed with a holistic concept of protection, education and sustainable development.
- **Management:** Body having a legal existence recognised under national legislation.
- **Reassessment Period:** UGGP status is not permanent; it is reassessed every four years.
- **Mandatory Networking:** Membership of the GGN is obligatory for UGGPs.
- **Current Status:** 229 UNESCO Global Geoparks in 50 countries (**none in India**).

6.2. POLYMETALLIC SULPHIDES

Why in the News?

India signed a **15-year exploration contract** for polymetallic sulphides (PMS) with International Seabed Authority (ISA) in Carlsberg Ridge.

About the contract

- This is the **first licence granted globally for exploring polymetallic sulphur nodules** in the Carlsberg Ridge.
 - Carlsberg Ridge located in the Arabian Sea, northwest Indian Ocean, forms the boundary between the Indian and Arabian tectonic plates.
- **Other Indian Contracts for exploration**
 - **Polymetallic Nodules** in the **Central Indian Ocean Basin** and **PMS in the Indian Ocean Ridge**.
 - > Polymetallic nodules, also called manganese nodules, are **rock concretions** formed of concentric layers of iron and manganese hydroxides around a core, such as a shark tooth or shell.
 - **Yet to be approved: Afanasy-Nikitin Sea (ANS) mount**
 - > ANS is located in the Central Indian Ocean and the territory has been claimed by Sri Lanka for exploration rights.

About Polymetallic sulphides (PMS)

- Rich sources of metals such as copper, zinc, gold, and silver, found on the ocean floor.
- Occur in regions where **hot, mineral-rich fluids** from the Earth's mantle are expelled into the ocean, leading to the precipitation of metal sulphides.



International Seabed Authority (ISA)



About: An autonomous international organization through which State Parties to UNCLOS organize and control all mineral-resources-related activities in the Area for the benefit of humankind.



Mandate: To ensure the effective protection of the marine environment from harmful effects that may arise from deep-seabed-related activities.



Genesis: Established in 1994 under the 1982 United Nations Convention on the Law of the Sea (UNCLOS) and the 1994 Agreement relating to the Implementation of Part XI of the United Nations Convention on the Law of the Sea.



Some recent initiatives:

- ▶ **Deep-Sea Biobank Initiative (DBI) 2025:** To establish a global repository enhancing access to deep-sea biological samples and genetic data from international seabed areas beyond national jurisdiction for research and capacity-building.
- ▶ **AREA2030:** For facilitating high resolution mapping of the international seabed area by 2030.
- ▶ **Sustainable Seabed Knowledge Initiative (SSKI):** Strengthen the scientific foundation for effective protection and management of the deep sea.



Members: 171 (Including India).

6.3. BHARAT FORECAST SYSTEM (BFS)

Why in the News?

Ministry of Earth Sciences unveiled BFS, world's first indigenously developed high-resolution weather forecast systems.

About Bharat Forecast System

- **Developed by:** Indian Institute of Tropical Meteorology (IITM), Pune, autonomous institute of Ministry of Earth Sciences.
- **Role:** Enhances India's weather prediction resolution from 12 km to 6 km, enabling every village in India to access more precise and location-specific forecasts.
- **Data Sources:** Integrates real-time inputs from 40 Doppler Weather Radar.
 - **Doppler Radar** is a specific type of radar that uses **doppler effect** (Change in frequency of wave emitted by a source moving relative to the observer) to gather velocity data from particles that are being measured.

Significance of BFS

- **64% better accuracy in high-risk zones** and produces forecasts within 4–6 hours (earlier models required around 12–14 hrs).
- **Positions India ahead of countries** like US, UK, and EU by achieving 6 km resolution (compared to 9–14 km in global models).
- Powered by **High-Performance Computing (HPC) systems** – Arka (IITM Pune) and Arunika (National Centre for Medium Range Weather Forecasting, Delhi).
- **Definitive Model:** Produces a single-model based output providing definitive forecast.

Other Measures

- **Mission Mausam:** Launched in 2024 by **Ministry of Earth Sciences (MoES)** to improve weather and climate services ensuring timely and precise observation, etc.

- **Implemented by:** India Meteorological Department (IMD), the National Centre for Medium-Range Weather Forecasting (NCFMRWF), and Indian Institute of Tropical Meteorology (IITM).

6.4. LONG-PERIOD AVERAGE (LPA)

Why in the news?

The India Meteorological Department (IMD) has forecast ‘above normal’ rainfall — 105% of the long-period average (LPA) of 87 cm (1971-2020) during the June-September southwest monsoon season.

About Long-period average (LPA)

- **Concept:** It refers to the average rainfall recorded over a specific region during a defined time interval.
- **Period:** It is calculated over a **long period**, usually **30-50 years**.
 - In India, the IMD currently uses the LPA based on rainfall data from **1971 to 2020**.
- **Purpose:** LPA serves as a benchmark to compare current or forecasted rainfall, helping to categorize it as normal, above normal, or deficient.

Category	Range of LPA	Meaning
Deficient	< 90%	Drought-like conditions
Below Normal	90% – 95%	Slightly less rain than usual
Normal	96% – 104%	Ideal, expected rainfall
Above Normal	105% – 110%	Slightly more rain than usual
Excess	> 110%	Risk of flooding

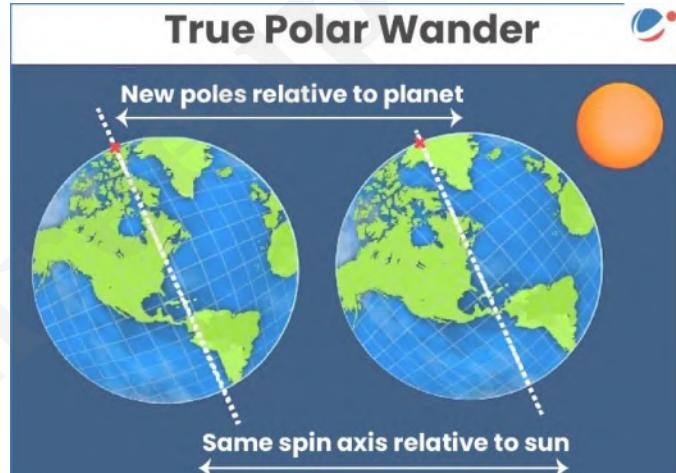
6.5. TRUE POLAR WANDER (TPW)

Why in the news?

A recent study revealed that dam construction has shifted Earth’s rotational axis by over 1 meter since 1835 i.e., they have driven **True Polar Wander (TPW)**.

About True Polar Wander (TPW) or planetary reorientation

- **Rotation of the solid Earth** (crust and mantle) **about the liquid outer core**.
 - It helps the Earth **maintain rotational balance** due to **mass redistribution**.
- **Natural Factors driving TPW:** Glacial melting, Ice sheet melt, tectonic plate shifts, and ocean swell.
- **Effects of Shifting Poles**
 - Affect **satellites and space telescopes**, which depend on Earth’s rotation for **accurate positioning**.
 - **Longer Days** as melting ice moves mass from the **poles to the equator**, making Earth slightly more flattened.
 - This slows down its spin, causing **longer days**. Since 2000, days have been getting longer by **1.33 milliseconds every 100 years**, faster than in the past century.



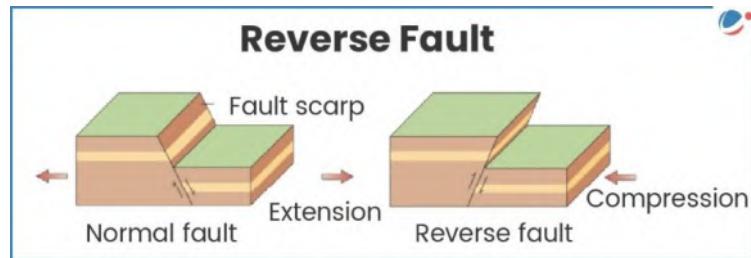
6.6. PACIFIC RING OF FIRE

Why in the News?

A magnitude 8.8 **earthquake** struck **Russia’s Kamchatka Peninsula**, part of the seismically active **Pacific Ring of Fire** potentially due to **shallow reverse faulting**, triggering **tsunami** waves that hit coasts in Russia and Japan.

About Reverse Faulting

- Reverse faulting (or thrust faulting) occurs when a block of Earth's crust is pushed up over another due to **compressional forces**.
- "Shallow" Reverse faulting means rupture occurred near the Earth's surface.
 - It can cause strong ground shaking, powerful aftershocks, tsunamis, and damage to infrastructure.



Pacific Ring of Fire

- Also called **Circum-Pacific Belt**, it is a **horseshoe-shaped belt** around the **rim of the Pacific Ocean** characterized by a high number of active and dormant **volcanoes** and frequent **earthquakes**.
 - Accounts for ~75% of the world's active volcanoes and ~90% of the world's earthquakes.
- Reasons for formation of Pacific of Fire**
 - Plate Tectonics:**
 - Convergent plate boundaries between the **Pacific Plate** and other plates like **Indo-Australian Plates, Juan de Fuca** etc. create **subduction zones**, leading to **volcanic activity**.
 - Divergent Boundaries create **seafloor spreading** and **rift valleys**. E.g. **East Pacific Rise**, where Pacific Plate diverges from Cocos, Nazca, and Antarctic Plates, featuring **volcanism and hydrothermal vents**.
 - Earth's deepest ocean trenches** (e.g. Mariana Trench) are located along Subduction zones, causing deep **earthquakes**.
 - Earthquakes occur along the **trenches** and **faults** as the **two plates scrape** against each other. E.g. transform boundary at **San Andreas Fault (California)**



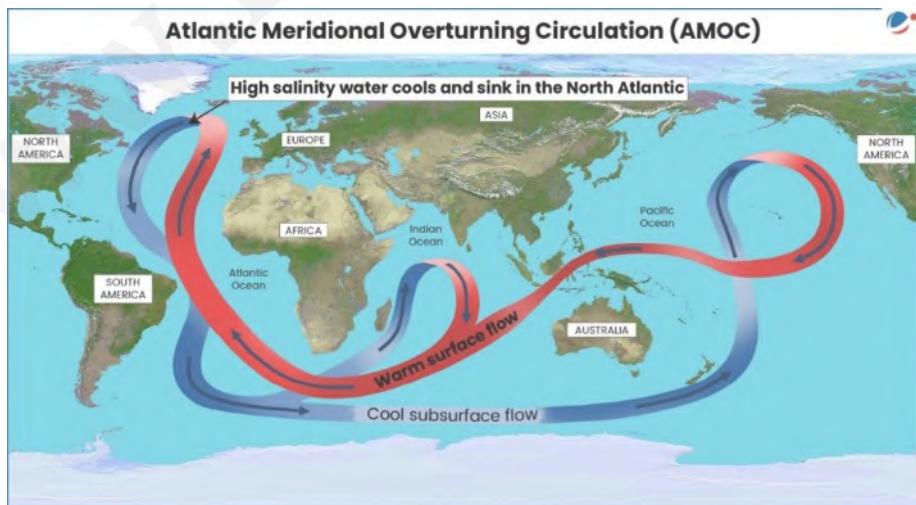
6.7. ATLANTIC MERIDIONAL OVERTURNING CIRCULATION (AMOC)

Why in the news?

A scientific reconstruction of 12,000 Years (Holocene Epoch) of **Atlantic Meridional Overturning Circulation (AMOC)** showed that after remaining largely **stable** (natural fluctuation) for most of the period, **modern AMOC** is showing unprecedented weakening.

AMOC

- A system of ocean currents **that circulates water within the Atlantic Ocean**, bringing warm water north and cold water south.
- Driving Force:** Differences in water temperature and salinity.
 - Warm tropical** water moves towards the **poles**, becomes cool & dense, **sinks** in the North Atlantic and **flows south** before **warming** and resurfacing thus restarting the cycle.



- Significance:**
 - Influences rainfall patterns, including Indian monsoon.
 - Heat Transport from the tropics to higher latitudes, moderating Europe's climate.
 - Transports dense and carbon-rich water masses from the surface to the deep ocean.
- Concerns:** Potential slowing down of AMOC due to increased influx of freshwater from melting Greenland ice sheet and Arctic amplification due to global warming.

Potential Impacts of AMOC Slowdown

- AMOC carbon feedback:** Reduction of ocean carbon uptake, leading to more atmospheric CO₂ and global warming.
- Extreme events:** E.g. Colder temperatures in Europe, could shift South Africa's rain belt (triggering droughts), Sea level rise (e.g. across the U.S. East Coast).
- Fewer nutrients transport:** Could affect all kinds of sea life, from plankton and sea birds to fish and whales.

6.8. DELAMINATION

Why in the news?

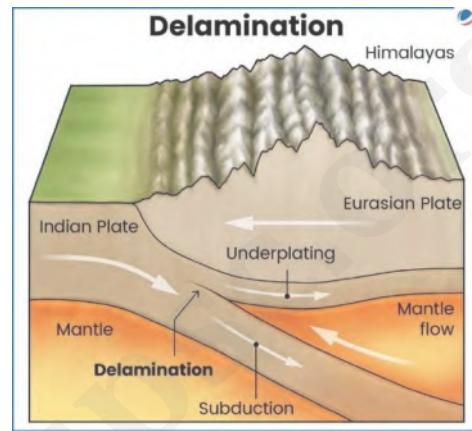
New research suggests that Indian Continental Plate is splitting apart and proposes a new theory explaining movement of the Indian Plate called '**Delamination**'

About Delamination

- It is where the **Indian plate's dense lower section** peels away and sinks into Earth's **mantle** as it slides beneath the Eurasian plate, leading to **splitting** of the Indian Plate.

Movement of Indian Plate

- Indian Continental Plate** is a major tectonic plate bordered by 4 major plates – Eurasian Plate, Arabian Plate, African Plate, and Australian Plate.
- It has **converged with the Eurasian plate** for 60 million years, forming the **Tibetan Plateau and Himalayas**.
- Two traditional theories** explain this:
 - Underplating:** The denser Indian lower crust slides beneath the Eurasian crust
 - Subduction:** One plate slides beneath another.



6.9. TERMS/CONCEPTS IN NEWS

Term/Concept	Details
Solar Tornado	<ul style="list-style-type: none"> Solar tornadoes are made of ionized gas (plasma), held in place by magnetic fields, and are formally known as tornado prominences. Can reach heights of 130,000 kilometers and rotate at speeds up to 200,000 kilometers per hour. Characteristics: Blisteringly hot, reaching around 250,000 °C, and can be observed at the sun's poles. <ul style="list-style-type: none"> As many as 11,000 can swirl above the sun's surface at any moment.
Cold Pools	<ul style="list-style-type: none"> Small-scale areas of evaporatively cooled downdraft air that spread on the surface underneath precipitating clouds. Phenomenon: When rain falls during a storm, some of it evaporates before reaching the ground. This evaporation cools the air, making it heavier. The cool, heavy air then sinks and spreads out across the ground like a shallow, cold bubble, forming a cold pool.
Earth's Deep Seafloor	<ul style="list-style-type: none"> Deep Ocean is generally defined as sea and seabed below the depth at which light starts to decrease rapidly, typically around 200 meters (where Twilight Zone starts).

	<ul style="list-style-type: none">Conditions: Deep ocean is cold – with an average temperature of only 4°C and is subject to extreme pressure, from about 40 to over 110 times the pressure of Earth's atmosphere.Biodiversity: Squid, krill, jellies, and fish are super abundant in Mesopelagic Zone (200m-1000m) with about 90% of world's fish (by weight).Significance of Exploration: Sources of energy (oil, gas, methane hydrate, ocean currents), promising source for new antibiotic and anti-cancer drugs, presence of polymetallic nodules, understanding, predicting and mitigating climate change etc.
Polar Anticyclone	<ul style="list-style-type: none">High-pressure wind systems created by the intense cooling of surface air layers.Formation:<ul style="list-style-type: none">Surface cooling makes air dense and causes it to sink.High-altitude air flows in to replace the sinking air, increasing the air mass and building high pressure.These processes increase the mass of air above the surface, thus creating the anticyclone.Anti-cyclone is a high-pressure area surrounded by low-pressure zones, with winds flowing outward from the centre.Air-circulation: Clockwise in Northern Hemisphere, anti-clockwise in Southern Hemisphere.
Thirstwave	<ul style="list-style-type: none">Periods of extreme atmospheric thirst (high evaporative demand) that rapidly dry out the landscape.<ul style="list-style-type: none">While a heatwave is defined by high temperature, a thirstwave is defined by high dryness and the air's aggressive demand for moisture.Technically, a thirstwave has at least 3 consecutive days when daily evaporative demand is greater than its historical 90th percentile value for that period.<ul style="list-style-type: none">Evaporative demand is a measure of how thirsty the atmosphere is.Factors driving evaporative demand: temperature, wind speed, humidity, and sunshine.
Mercator's Map	<ul style="list-style-type: none">Designed in 1569 by Gerardus Mercator, this projection aimed to solve navigation issues by making rhumb lines appear as straight lines on a flat map.Characteristics: A conformal map, preserving local shapes and angles, achieved by stretching the north-south scale.It distorts scale, showing landmasses near the poles as larger and equatorial regions as smaller than reality. E.g., Africa appears roughly as large as Greenland, despite being 14 times bigger.<ul style="list-style-type: none">African Union has endorsed the 'Correct the Map' campaign to replace the Mercator map projection with alternatives such as the Equal Earth map.
Arabian Sea Mini Warm Pool	<ul style="list-style-type: none">The Arabian Sea MWP is a small patch of unusually warm sea surface temperatures (SST) in the Arabian Sea, especially the southeastern part (near the Kerala coast).<ul style="list-style-type: none">A warm pool is defined as a body of very warm water, typically with sea surface temperatures exceeding 28.5°C, that plays a significant role in influencing regional climate and weather patterns.Duration: Forms every year during April and May, just before the onset of the Indian Summer Monsoon.Arabian Sea Mini Warm Pool (MWP) acts as a self-correcting mechanism that helps the monsoon recover from the disruptions caused by the previous El Niño.

6.10. ORGANIZATIONS IN NEWS

6.10.1. NATIONAL CENTRE OF POLAR AND OCEAN RESEARCH (NCPOR)



National Centre of Polar and Ocean Research (NCPOR)



About: India's premier **R&D institution** responsible for the country's research activities in the **polar and Southern Ocean realms**.



Genesis: 1998, an **autonomous Institution** of the **Ministry of Earth Sciences**.

► It recently completed 25 years.



Governing Body: Comprises of **13 members** representing a cross section of the country's leadership in Polar and Ocean Sciences.

► **Secretary, Ministry of Earth Sciences** is the **ex-officio chairman**.



Key Roles of NCPOR

► **Maintenance of India's research stations** in **Antarctica (Maitri and Bharati), the Arctic (Himadri), and the Himalayas (Himansh)**.

► **Leads Deep Ocean Mission**, the Flagship initiative focused on **exploring deep-sea mineral resources and hydrothermal systems** in the Indian Ocean.

► Aids in the Implementation of **India's Arctic Policy (2022)** and **Indian Antarctica Act (2022)**



Recently launched first-of its-kind facilities at NCPOR

► **Polar Bhavan:** Includes **laboratories for polar and ocean research**, would house **India's first Polar and Ocean Museum**.

► **Sagar Bhavan:** Includes **two -30°C ice core laboratories** and +4°C storage units for archiving sediment and biological samples.



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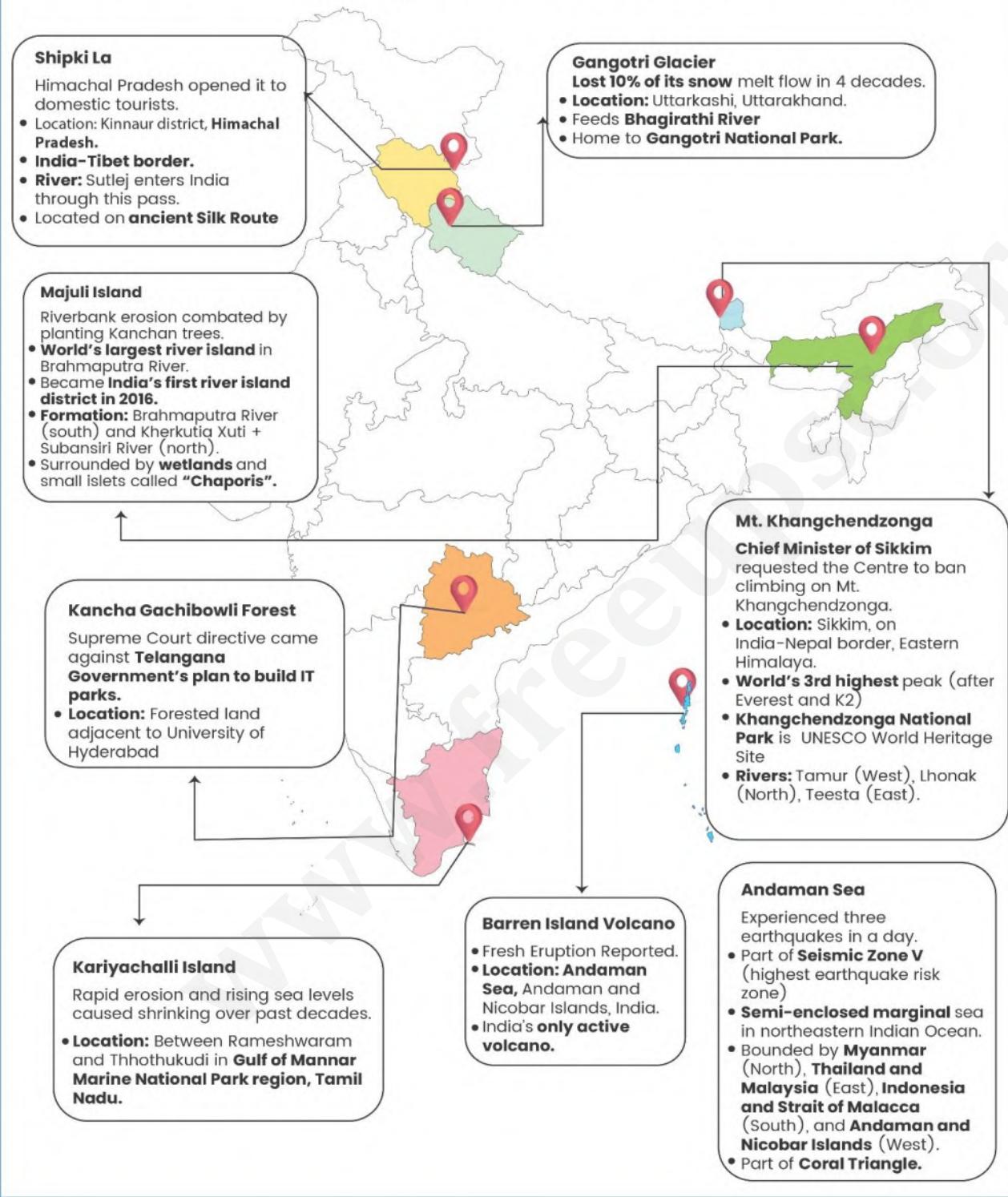
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7. PLACES IN NEWS

7.1. INDIA

7.1.1. GEOGRAPHICAL FEATURES IN NEWS

India: Geographical Features in News

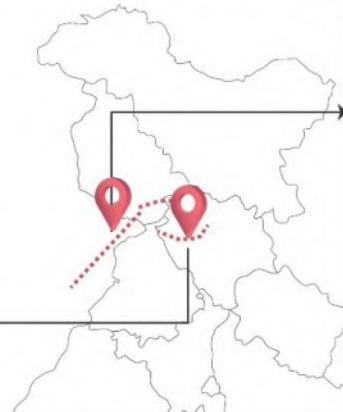


7.1.2. RIVERS IN NEWS

India: Rivers in News

Beas River

- Ravi and Beas Waters Tribunal, formed in 1986, got an extension of another year
- **Origin:** Beas Kund, southern face of Rohtang Pass (Kullu).
- **Course:** Joins Sutlej at Harike, Punjab.
- **Tributaries:** Bain, Banganga, Luni and Uhal.
- Forms the valleys of Kullu and Kangra.
- **Ancient name:** Vipasha (sanskrit)



Chenab River

Forest advisory committee granted 'in-principle' approval for diversion of forest land towards Sawalkot HEP.

- **Origin:** Bara Lacha Pass.
- **Formed by Chandra and Bhaga .**
- Largest tributary of Indus (joins Indus at **Mithankot, Pakistan**);
- **Jhelum joins Chenab** near Jhang in Pakistan.
- **Tributaries:** Miyar Nalla, Sohal, Thirot, Bhut Nalla, Marusudar and Lidrari.

Subansiri River

Commercial operation inaugurated of Subansiri Lower Hydroelectric Project (LEP).

- **Origin:** Tibet
- **Largest tributary of Brahmaputra.**
- **Course:** Enters Arunachal Pradesh, flows into Assam, and joins Brahmaputra.
- Called the "Gold River".
- Other projects: Oju Hydroelectric Project.



Kopili River

NW-57 on it operationalised in Assam.

- **Origin:** Saipong Reserve Forest in Meghalaya
- A major left bank tributary of Brahmaputra.
- **Flows through:** Meghalaya and Assam.

Siyom River

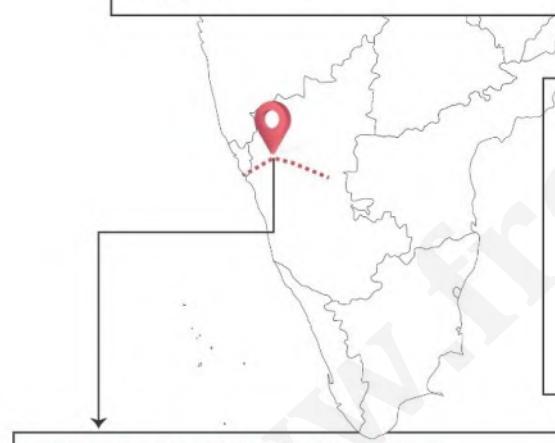
Hydroelectric projects (**Heo, Tato-I, Tato-II**) established in Arunachal Pradesh on it.

- **Origin:** Eastern Himalayas.
- Joins Siang (Brahmaputra in Arunachal Pradesh).

River Mandovi/Mhadei/Mahadayi

Centre extended the tenure of **Mahadayi water tribunal** for one year under **Inter-State River Water Disputes Act, 1956**.

- **Origin:** Bhimgad in Western Ghats in Belagavi, Karnataka.
- **Joins Zuari**, both flush out into Arabian Sea, forming Mormugao harbour.
- **Flows through:** 2/3rd in Goa, rest in Karnataka and Maharashtra.
- **Waterfalls:** Dudhsagar and Varapoha.
- **Tributary:** River Mapusa.



Subarnarekha River

Flash flood in Balasore, Odisha.

- **Origin:** Near Piska village, close to Ranchi, Jharkhand.
- **Basin Region:** Jharkhand, Odisha & West Bengal.
- **Mouth:** Into Bay of Bengal.
- **Tributaries:** Kanchi, the Karkari and the Kharkai.
- **Hundru Falls** located on it.
- **Subarnrekha Waterway** is declared as National Waterway-96.

7.1.3. OTHERS

India: Other Places in News

Ranjit Sagar Dam (Thein Dam)
Heavy discharge from it led to floods.
• Location: Near Pathankot, on the Punjab-Jammu & Kashmir border.
• River: Ravi

Etalin hydroelectric project
Forest Advisory Committee (FAC) gave "in-principle" approval at a high conservation value area.
• Location: Dibang Valley, Arunachal Pradesh (Part of Eastern Himalaya Global Biodiversity Hotspot)
• Rivers: Dri and Tangon .

Kaleshwaram Lift Irrigation Project (KLIP)
National Dam Safety Authority (NDSA) reported significant damage to KLIP barrages post-2023 flooding incident.
• World's largest multi-stage lift irrigation project on Godavari River in Kaleshwaram, Telangana.
• Godavari river, aka Dakshin Ganga, is largest Peninsular river.
• Rises from Western Ghats in Nasik, Maharashtra and drains into Bay of Bengal.

Pamban Bridge
Recently, Prime Minister inaugurated the new Pamban Bridge in Tamil Nadu.
• Replaces original cantilever Bridge, decommissioned in 2022, connecting Rameswaram Island to mainland India.
• Designed by Rail Vikas Nigam Limited (RVNL).

7.2. INTERNATIONAL

7.2.1. GEOGRAPHICAL FEATURES IN NEWS

World: Geographical Features in News

Davis Strait Proto-Microcontinent

Scientists discovered a hidden continent beneath **Greenland's ice**, called Davis Strait Proto-Microcontinent.

- Proto-Microcontinents are “regions of relatively thick continental lithosphere separated from major continents by a zone of thinner continental lithosphere.”
- Located beneath the Davis Strait (connects Labrador Sea and Baffin Bay)

Arctic Biome

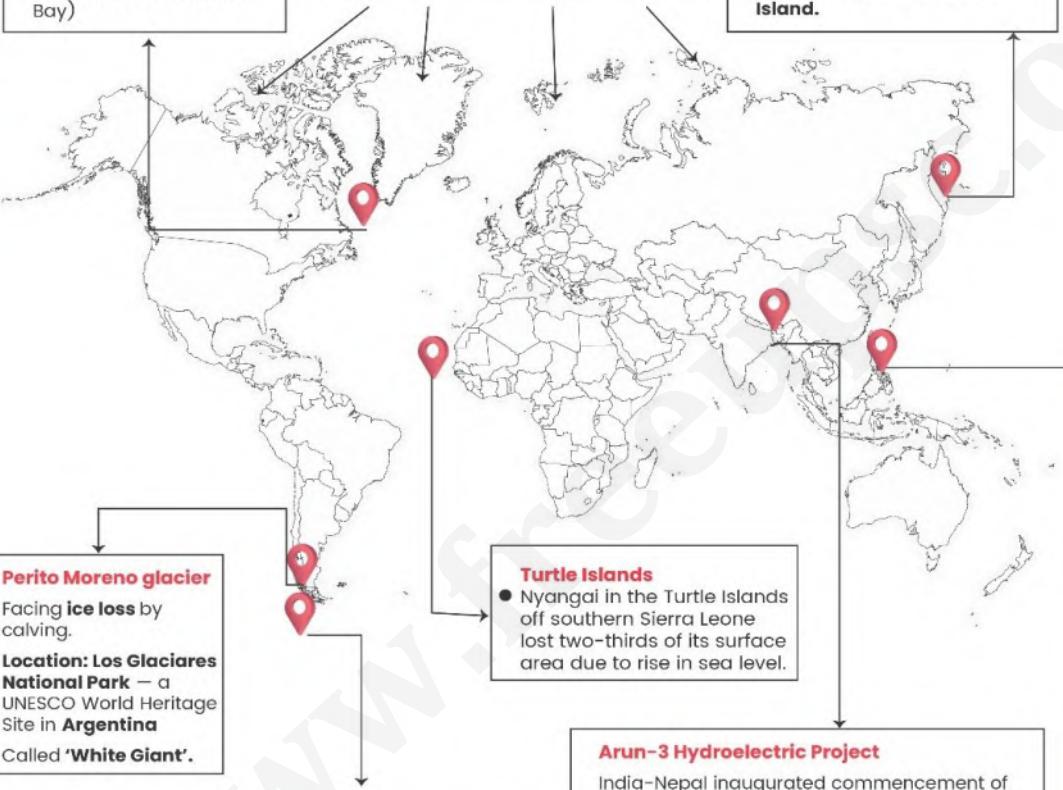
Wildfires around the globe are reducing its carbon absorbing capacity.

- **Location:** North of the **Arctic Circle** ($66^{\circ} 33'N$), includes areas of **Alaska, Canada, Greenland, and Russia**.
- **Permafrost is a defining characteristic.**
- **Vegetation:** With **no deep root systems (mosses, lichens, dwarf shrubs, grasses, and sedges)**.

Kamchatka Peninsula

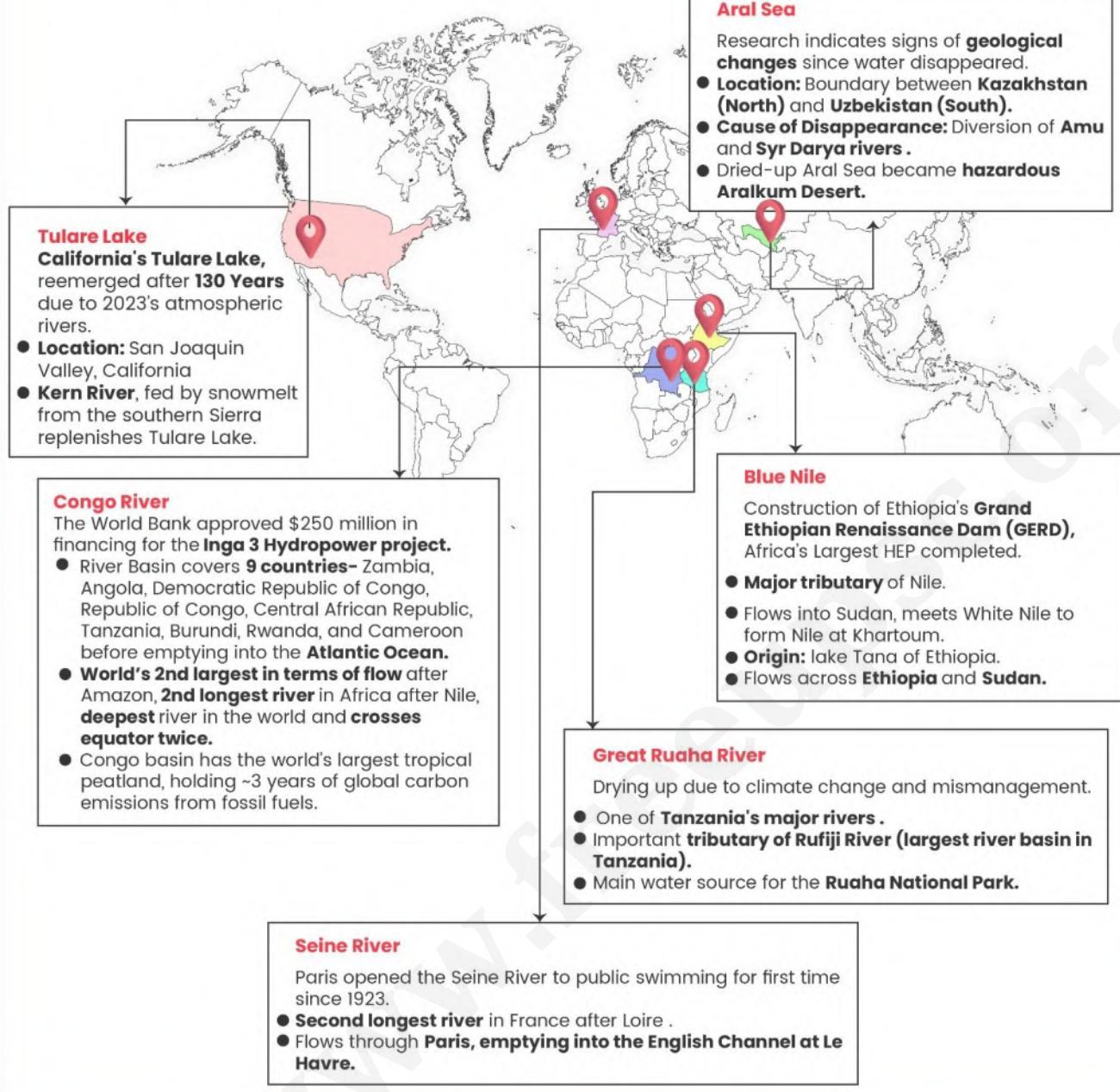
Five powerful **earthquakes** struck offshore in Russia's Kamchatka Peninsula.

- **Location:** Russian Far East on the **Pacific Ring of Fire**.
- Surrounded by **Bering Sea** and **Pacific Ocean (east)** and **Sea of Okhotsk (west)**.
- **Kuril Archipelago** (disputed between Russia and Japan) **extends from the southern tip of Russia's Kamchatka Peninsula to the northeastern coast of Japan's Hokkaido Island.**

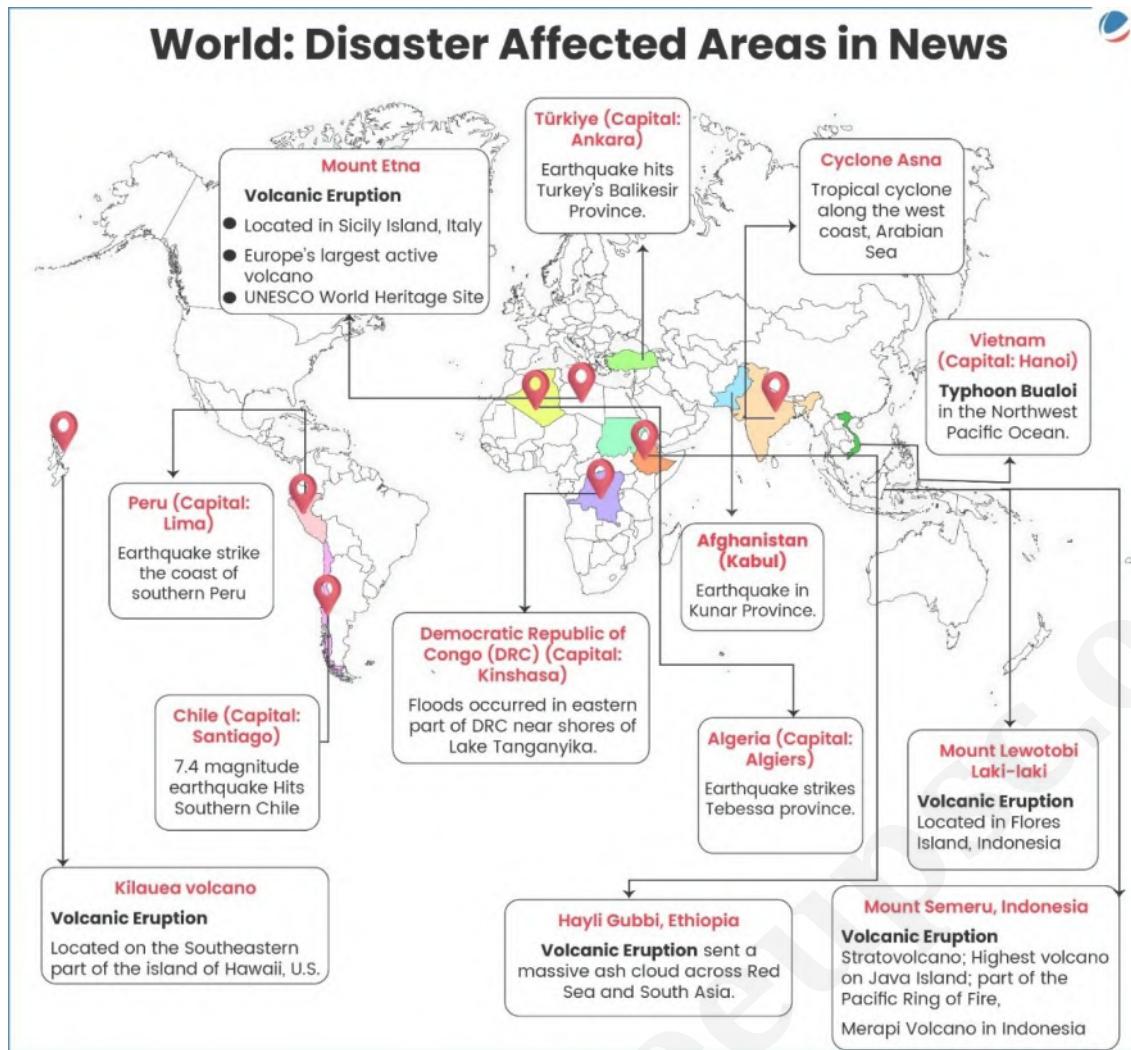


7.2.2. RIVERS/WATER BODIES IN NEWS

World: Rivers/Water Bodies in News



7.2.3. DISASTER AFFECTED AREAS IN NEWS



VISIONIAS
INSPIRING INNOVATION

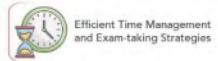
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(Approach is to revise and strengthen fundamental concepts, enhance problem-solving abilities, hone analytical skills, foster critical thinking, and improve comprehension skills for Prelims 2026.)

PROGRAM OUTCOMES



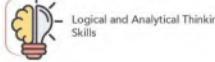
Efficient Time Management and Exam-taking Strategies



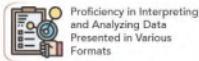
Problem-Solving Techniques Including Tips and Tricks



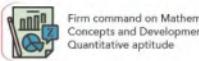
Reading Comprehension and Language Proficiency



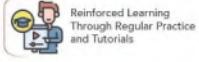
Logical and Analytical Thinking Skills



Proficiency in Interpreting and Analyzing Data Presented in Various Formats



Firm command on Mathematical Concepts and Development of Quantitative aptitude



Reinforced Learning Through Regular Practice and Tutorials



Development of Confidence to Tackle the Exam

7.2.4. COUNTRIES IN NEWS

World: Countries in News

Vanuatu (Capital: Port Vila)
Approached the International Court of Justice to classify environmental destruction as ecocide.

Columbia (Capital: Bogotá)
Second WHO Global Conference on Air Pollution and Health, co-organized by WHO and Columbia and other UN Agencies like UNEP, WMO etc., was held in Cartagena.

Denmark (Capital: Copenhagen)
India and Denmark reaffirm Green Strategic Partnership to expand economic relations and green growth, create jobs.

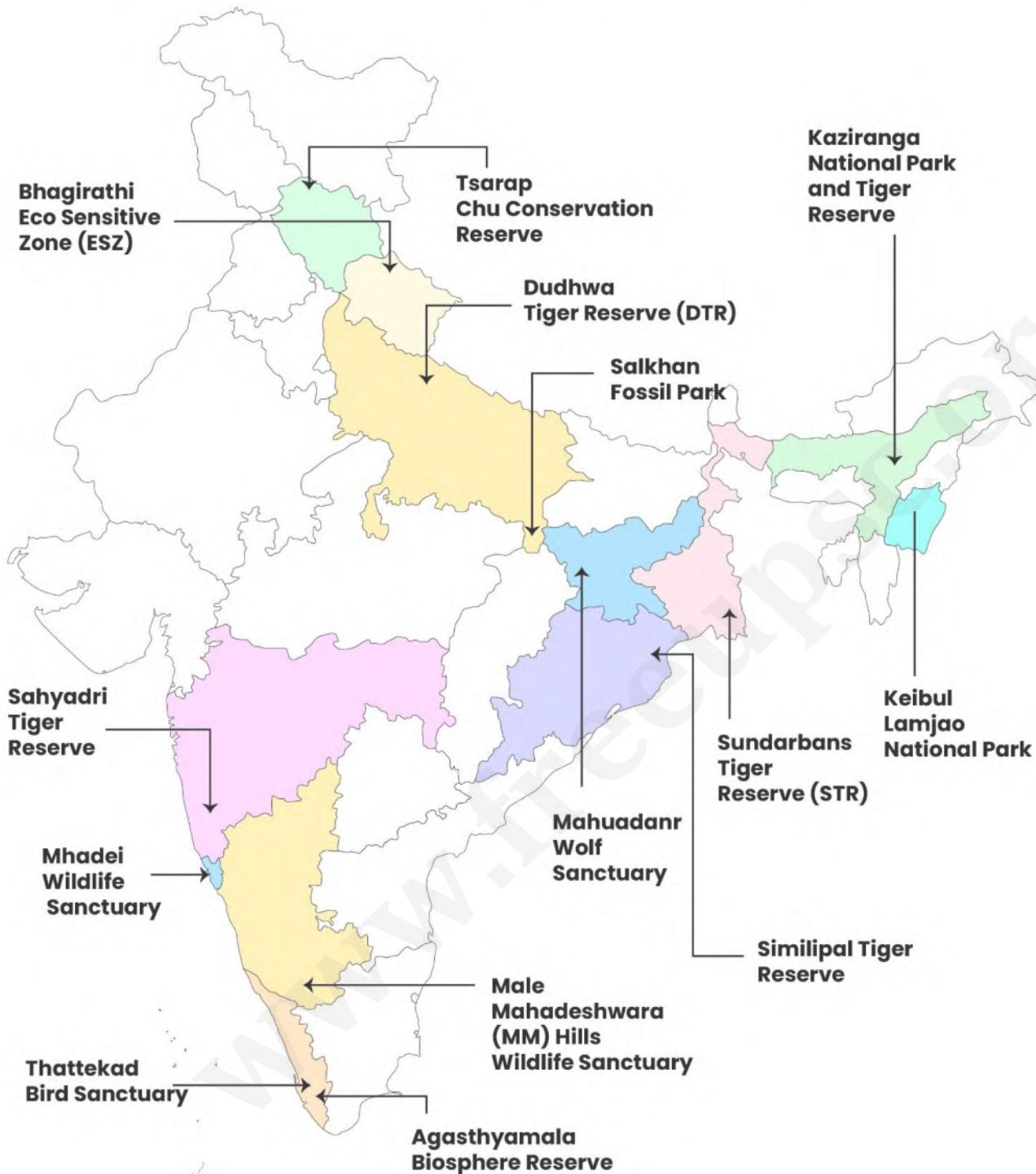
Ethiopia (Capital: Addis Ababa)
UN Food Systems Summit +4 Stocktake (UNFSS+4) held in Addis Ababa. UN Food Systems Summit was launched in 2021.

Tuvalu (Capital: Funafuti)
Threatened by rising sea levels, signed the 2023 Falepili Union Treaty with Australia

Ecuador (Capital: Quito)
Indigenous groups of Ecuador criticize the \$47 billion oil drilling expansion plan in the Amazon.

8. PROTECTED AREAS IN NEWS

Protected Areas in News



Assam

Kaziranga National Park and Tiger Reserve



Context: First-ever grassland bird census was held here using **Acoustic Monitoring Technique**.

- **Location:** Brahmaputra floodplain, at foothills of Karbi-Anglong
- **River:** Difflu and Moradiflu.
- **Forest type:** Alluvial grasslands, semi-evergreen and moist deciduous forests, wetlands, and sandy chaura.
- **Key Fauna:** One-Horned Rhino (70% of population), Tiger, Eastern swamp deer, Elephant, Hoolock gibbon, Capped langur and Gangetic River Dolphin etc.
- Recorded **3rd highest tiger density** in India after Karnataka's Bandipur and Uttarakhand's Corbett National Park.
- Recognized as an **Important Bird Area** by BirdLife International.

Goa

Mhadei Wildlife Sanctuary

Context: Recently, Supreme Court stayed projects here.

- **Location:** North Goa along **Western Ghats**, bordering Karnataka and Maharashtra.
- **River:** Mhadei (Mondovi) River flows through wildlife sanctuary.
- **Fauna:** Tigers, leopards, sloth bears, gaurs, sambar deer, etc.
- **Forest type:** Moist deciduous vegetation and some evergreen species, e.g. rare **Ashoka tree** with peculiar saffron colored flowers.

Himachal Pradesh

Tsarap Chu Conservation Reserve

Context: Himachal Pradesh notified it (India's largest conservation reserve) in Spiti Valley.

- **Location:** Confluence of Unam River and Charap Nala.
 - Bounded by **UT of Ladakh** to north, the Kibber Wildlife Sanctuary extending up to Malang Nala and Lungar Lungpa to east, Kabjima Nala to south and Chandratal Wildlife Sanctuary to west.
- **River:** Confluence of the Unam River and Charap Nala.
- **Fauna:** Known for **snow leopard**, Tibetan wolf, bharal (blue sheep), Himalayan ibex, kiang (wild ass), and Tibetan argali, rare bird species such as Rose Finch, Tibetan Raven, etc.

Jharkhand

Mahuadanr Wolf Sanctuary

Context: witnessed unique practice of tribals from the '**Sarna faith**' to avoid the Sal Forest during winter months.

- **Location:** India's first and only dedicated wolf sanctuary, located **within the Palamu Tiger Reserve** in Jharkhand.
- **River:** Burha River flow through **Mahuadanr valley**.

Karnataka

Male Mahadeshwar a (MM) Hills Wildlife Sanctuary

Context: Five tigers found dead in MM Hills Wildlife sanctuary.

- **Location:** Southeast Karnataka.
- Forms **connecting corridor** between **Biligiri Ranganatha Swamy Temple (BRT) Wildlife Sanctuary** and **Cauvery Wildlife Sanctuary**.
- **Forest type:** Dominated by **dry deciduous forests** and Patches of **Semi-evergreen, Shola forests** at higher altitudes and **scrub forests** in fringe zones.
- **Fauna:** Tiger, Elephant, Leopard, Wild dog (dhole), Sloth bear, etc.
- Important corridor in the **Eastern Ghats–Western Ghats landscape**.

Kerala

Thattekad Bird Sanctuary

Context: Faunal survey adds nine new species in Thattekad Bird Sanctuary.

- ▶ **Location:** Ernakulam District, Kerala.
- ▶ Kerala's first bird sanctuary, recognized as one of richest ecological zones in Western Ghats.
- ▶ **Forest type:** Tropical Evergreen Forests, Tropical Semi-evergreen forests, Moist Deciduous forests, Riparian Forests, Plantations of Teak, Rosewood, Mahogany and Fruit Orchard.
- ▶ **River:** Periyar and Idamalayar rivers.
- ▶ **Fauna:** Leopard, Sloth Bear, Porcupine etc.

Maharashtra

Sahyadri Tiger Reserve

Context: MoEFCC granted approval for Translocation of 8 Tigers from Tadoba-Andhari Tiger Reserve and Pench Tiger Reserve to Sahyadri Tiger Reserve in accordance with **Wildlife (Protection) Act, 1972**.

- ▶ **Location:** Sahyadri Ranges of Western Ghats in Maharashtra.
 - ▶ Northern most tiger habitat in Western Ghats.
 - ▶ Notified in 2010 by amalgamating the **Chandoli National Park and Koyana Wildlife Sanctuary**.
- ▶ **Reservoirs:** "Shivsagar" reservoir of Koyana River and "Vasant Sagar" reservoir of Warana River.
- ▶ **Flora:** Anjani, Jambhul, Pisa, etc.
- ▶ **Fauna:** Wild dog, Leopard, Gaur, Sambar, Four Horned Antelope, Mouse Deer, Giant Squirrel, Indian long-billed Vulture, endemic Hornbills, Indian River Tern.

Manipur

Keibul Lamjao National Park

Context: Study links land use to water pollution in Manipur's Loktak Lake.

- ▶ **Location:** Bishnupur and Thoubal district of Manipur.
- ▶ Only floating park in the world.
- ▶ Largest area of Phumdi (floating Islands of vegetation) in Loktak lake is in this park.
 - ▶ Loktak lake, a Ramsar site and Montreux Record site, is largest freshwater lake in Northeast India and is famous for phumdis.
- ▶ **Fauna:** Brow-antlered deer (Sangai), Hog Deer, Otter.

Odisha

Similipal Tiger Reserve



Context: Odisha notified Similipal Tiger Reserve as National Park making it largest in Odisha, leaving behind Bhitarkanika.

- ▶ **Location:** Mayurbhanj District, Odisha in Chottanagpur region.
- ▶ **Rivers:** Burhabalanga, Palpala Bandan, Salandi, Kahairi, and Deo.
- ▶ Forms part of **Mayurbhanj Elephant Reserve**.
- ▶ **Waterfalls:** Joranda and Barehipani
- ▶ **Tribes Found:** Kolha, Santhala, Bhumija, Bhatudi, Gondas, Khadia, Mankadia and Sahara.

Tamil Nadu

Agasthyamala Biosphere Reserve



Context: SC Orders Probe into Violations of Forest and Wildlife Laws in Tamil Nadu's Agasthyamalai Landscape.

- ▶ **Location:** Located in **Southern Western Ghats** in **Tamil Nadu and Kerala**.
 - ▶ Includes 3 WLSs: **Shendurney, Peppara and Neyyar (Kerala)**, and **Kalakad Mundanthurai Tiger Reserve (Tamil Nadu)**.
 - ▶ Includes **Periyar Tiger Reserve, Srivilliputhur Grizzled Squirrel WLS, Meghamalai and Thirunelveli WLS**.
- ▶ **Rivers:** Thamirabarai River.

Uttar Pradesh

Dudhwa Tiger Reserve (DTR)

Context: Leopard population in DTR has **grown by 198.91% since 2022**.

- ▶ **Location:** Terai region of Uttar Pradesh, along Indo-Nepal Border.
Includes **Dudhwa National Park** and **Katerniaghata and Kishanpur**.
 - ▶ **Forest type:** Typical **Tarai-Bhabar habitat** of upper Gangetic plains
 - ▶ Bio-geographic province and consists of vast **alluvial plain**.
- ▶ **Rivers:** Mohana, Suheli, Joraha, Nagro etc.
- ▶ **Fauna:** Tiger, Leopard, Rhinoceros, Swamp Deer, Elephant, Sambar, Hog deer, Sloth Bear etc.

Salkhan Fossil Park

Context: Salkhan Fossil Park added to UNESCO Tentative List For World Heritage Sites, officially known as **Sonbhadra Fossils Park**, Sonbhadra, Uttar Pradesh.

- ▶ It qualifies as **a geo-heritage site** under **IUCN's 2020 guidelines for "Evolution of Life"** and matches **UNESCO's 2021 framework on Earth's history and life evolution**.
- ▶ **Location:** Kaimur Range (part of Vindhya range), adjacent to **Kaimur Wildlife Sanctuary**.
- ▶ One of **oldest and most well-preserved sites** in world (fossils dating ~1.4 billion years).
- ▶ **Site's fossil assemblage features Stromatolites** created by communities of Cyanobacteria or blue green algae.
- ▶ These fossilized microbial structures record **Great Oxidation Event**, when oxygen first accumulated in atmosphere.

Uttarakhand

Bhagirathi Eco Sensitive Zone (ESZ)

Context: Recently, Uttarakhand Government granted approval for **Netala bypass project** in **fragile Bhagirathi ESZ** despite previous rejections by **Supreme Court's high-powered committee (HPC)** due to **ecological and social concerns**.

- ▶ Created to protect **River Ganga's** most pristine stretch between **Gaumukh and Uttarkashi town**.
- ▶ **Eco-sensitive Zones** are **ecologically fragile areas** around Protected Areas and wildlife corridors and act as "**Shock Absorber**".
 - ▶ **Notification:** By the **Ministry of Environment, Forest and Climate Change (MoEF&CC)** in **2012** with subsequent amendment in **2018** under **Environment (Protection) Act, 1986**.
 - ▶ **Zonal Master Plan (ZMP):** Mandates **Uttarakhand** Government to prepare **ZMP** based on **watershed approach** and includes governance of key areas of forests and wildlife, etc.

West Bengal

Sundarbans Tiger Reserve (STR)



Context: STR is now India's second largest after expansion of its area was approved by **National Board of Wildlife (NBWL)**.

- ▶ Now STR is just behind Andhra Pradesh's **Nagarjunasagar-Srisailam Tiger Reserve** in size.
- ▶ **Location:** Coastal districts of **West Bengal**.
- ▶ Only mangrove forest (with Bangladesh) housing a significant tiger population.
- ▶ **Borders:** Bangladesh (east), Bay of Bengal (south), River Matla (west), Rivers Bidya & Gomdi (north-west).



The advertisement features the Vision IAS logo at the top left, followed by the text "SMART MAPPING CLASSES". Below this, the main heading "Smart MAPPING CLASSES" is displayed in large, bold, brown letters. Underneath it, "GENERAL STUDIES PRELIMS" and "UPSC CSE 2026" are written in white. A subtext "(An Exam-Focused & Interactive Mapping Program for Prelims 2026)" is also present. At the bottom, a calendar icon shows "JAN 27th Jan", a clock icon shows "11 AM", and a red button on the right says "Live/Online & Offline Classes". The background includes a world map and a hand drawing on a map.

9. SPECIES IN NEWS

Note:

As per the amendments made under the '**Wild life (Protection) Amendment Act, 2022**', all species that are covered under **Appendices of CITES** are now listed under **Schedule IV of the Act**.



TERRESTRIAL SPECIES

Snow Leopard



Context:

- Study estimated 477 snow leopards in Ladakh.



Habitat:

- Mountainous regions of South and Central Asia.
 - India:** Jammu & Kashmir, Ladakh, Himachal Pradesh, Uttarakhand, Sikkim and Arunachal Pradesh
 - Globally, **Hemis National Park, Kargil, and Leh** have highest extensive densities



WPA, 1972

Schedule I



Covered under
Species Recovery
Programme



Characteristics:

- Solitary animals; unlike other big cats they cannot roar.



Conservation Efforts

- Project Snow Leopard India; International Big Cat Alliance; Global Snow Leopard and Ecosystem Protection Programme; Bishkek Declaration (2017); Samarakhand Resolution (2024); **State animal of Himachal Pradesh and Ladakh; CaTRAT (Camera Trap data Repository and Analysis Tool)** to identify Himalayan snow leopards.

Greater One-Horned Rhino



Context:

- Assam Forest Department started DNA profiling of Rhino horns and add it to **Rhino DNA Index System (RhoDIS)** India DNA data library.



WPA, 1972

Schedule I



Covered under
Species Recovery
Programme



Habitat:

- ▶ **Assam** has the world's largest population.
 - ▶ More than 90% of them are in **Kaziranga National Park**.



Characteristics:

- ▶ **One among 5 species of rhino:** 2 African- White Rhino (Near Threatened), Black Rhino (Critically Endangered) and 3 Asian- Sumatran (Critically Endangered), and Javan (Critically Endangered).
- ▶ **Indian Rhino is largest of all Asian** rhino species
- ▶ Usually solitary
- ▶ Males maintain loosely defended territories.



Conservation initiatives:

- ▶ National Rhino Conservation Strategy 2019 for Indian rhino; New Delhi Declaration on Asian Rhinos 2019; Indian Rhino Vision 2020 etc.

Nilgiri Tahr



Context:

- ▶ Traditional Nilgiri tahr habitats in Coimbatore Forest Division show signs of population revival.



Habitat:

- ▶ Open montane grassland habitats, Endemic to **Western Ghats**
 - ▶ **Eravikulam National Park, Kerala** has largest contiguous population



WPA, 1972
Schedule I



Covered under Species Recovery Programme



Characteristics:

- ▶ **Only mountain ungulate** in southern **India**
 - ▶ Locally known as "**Varaiadu**"
 - ▶ **Silappathikaram** and **Sivakasindamani** mention its descriptions



Conservation Efforts:

- ▶ Project Nilgiri Tahr of Tamil Nadu; state animal of Tamil Nadu; Nilgiri Tahr Day (October 07).

Dhole (Asiatic Wild Dog)



Context:

- Dhole, once thought extinct in the region, has made a comeback in **Assam's Kaziranga-Karbi Anglong Landscape (KKAL)**.



Habitat:

- India, Cambodia, Nepal, Bhutan, Thailand, Central Asia, etc.
- Inhabits Eastern & Western Ghats, Assam, Meghalaya, West Bengal, Ladakh etc.



WPA, 1972
Schedule I



Characteristics:

- Carnivores, resembles small wolf or domestic dog in size, hunt mainly in early morning or late evening.

Alpine Musk Deer



Context:

- Central Zoo Authority (CZA) report revealed a mix-up in identifying Alpine musk deer for conservation breeding, mistaking it for its Himalayan counterpart.



Habitat:

- Temperate climate in alpine meadows, shrub lands, birch, blue pine and fir forests.
- Native species of **India, Nepal, Bhutan and China**.



WPA, 1972
Schedule I



Characteristics:

- Solitary and shy, herbivorous.
- Unique with **fangs** and without antlers and gall bladder.



Threat:

Poaching for muskpod used in perfumes and traditional medicines.

Indian Grey Wolf (*Canis lupus pallipes*)



Context:

- ▶ Indian grey wolf faces an added risk from dog attacks in Kadbanwadi grassland, Maharashtra.



Habitat:

- ▶ Peninsular India including Rajasthan, Gujarat, etc.



WPA, 1972
Schedule I



Characteristics:

- ▶ Subspecies of grey wolf; Travels in smaller packs and is less vocal than other variants of Grey wolf; Occupies a top predator niche in arid and semi-arid open plains and grasslands of India.

Bonobo



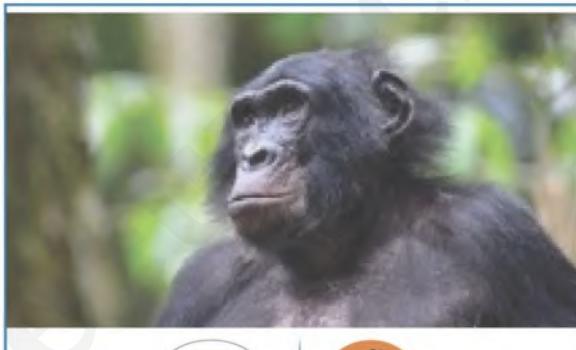
Context:

- ▶ Study found that vocal communication between Bonobos shows compositionality, just like human language.



Habitat:

- ▶ Only in forests of **Democratic Republic of Congo (DRC)**.



CITES
Appendix I

IUCN STATUS
EN



Characteristics:

- ▶ Like Chimpanzees, they share **98.7% of DNA** with humans making them closest living relatives to humans.
- ▶ Bit smaller, leaner and darker in appearance,
- ▶ Peaceful and their group is led by females.



AVIAN SPECIES

Malabar Grey Hornbill



Context:

- Researchers from Kerala were awarded Future Conservationist Award by **Conservation Leadership Programme (CLP)** for conserving Malabar Grey Hornbill.
 - CLP is partnership of Fauna & Flora International, BirdLife International and Wildlife Conservation Society.



Habitat:

- Endemic to **Western Ghats of India**.



WPA, 1972
Schedule I



Characteristics:

- Lacks the casque typical of Hornbill; Loud, laugh-like call.

Greater Flamingo



Context:

- Tamil Nadu notified **Greater Flamingo Sanctuary** at Dhanushkodi to preserve a critical stopover point along **Central Asian Flyway**.



Habitat:

- Breeds in shallow wetlands that are either saline or alkaline.
 - Distributed in Africa, western Asia (India), and southern Europe.
 - Kachchh Desert Wildlife Sanctuary in Great Rann of Kachchh (GRK) in Gujarat**, is a unique Protected Area, supporting **South Asia's only breeding ground of Greater Flamingos**, internationally renowned as "Flamingo City".



CITES
Appendix II



Characteristics:

- Great dispersal capacity outside breeding season, highly philopatric (return to or remain near a particular site or area).

AQUATIC SPECIES

Dugong



Context:

- IUCN adopted a motion recognizing **India's first Dugong Conservation Reserve** in Palk Bay at IUCN World Conservation Congress 2025.
- Dugong Conservation Reserve** was established in 2022, by Tamil Nadu government under **Wildlife Protection Act, 1972**.



Habitat:

- 40 countries from East Africa to the Pacific. (largest population in Australia).
- India:** Palk Bay (highest), Gulf of Mannar, Gulf of Kutch, etc



Characteristics:

- Only marine herbivorous mammals that depend on seagrass. ("sea cows")



Threat:

- Habitat degradation, hunting and unintentional captures.



WPA, 1972

Schedule I



Covered under Species Recovery Programme

Olive Ridley Turtle (ORT)



Context:

- Operation Olivia shielded over **8-lakh ORT on Odisha's Gahirmatha coast**.



Habitat:

- Warm, tropical waters of the Pacific, Atlantic, and Indian Oceans



WPA, 1972

Schedule I



Characteristics:

- Undergo unique mass nesting called arribadas; Smallest and most abundant of all sea turtles



Conservation:

- Operation Olivia (Initiated in 1980s, by Indian Coast Guard & is conducted every year from November to May).
 - Focuses on Gahirmatha Beach, Rushikulya River Mouth, and Devi River Mouth

Asian Giant Softshell turtle (*Pelochelys cantorii*)



Context:

- Documentary on saving these in Kasargod, Kerala won Dadasaheb Phalke award.



Habitat:

- Large lowland rivers, lakes, reservoirs and estuarine areas including mangrove channels and coastal mudflats near river mouths.
 - Called Cantor's giant softshell turtle, long freshwater turtle found in South and South-east Asia.
 - Called Bhimanama (bhiman means giant and aama is turtle) in Kerala.



Characteristics:

- Flattened head and widely spaced eyes, Ambush predators with aggressive behavior, a lightning speed strike and a powerful jaw.

Labeo uru and Labeo chekida



Context:

- ICAR-National Bureau of Fish Genetic Resources (NBFGR) discovered two new fish species.
- Labeo uru:** Named after traditional wooden dhow for its sail-like elongated fins, found in **Chandragiri River** (west flowing interstate river originating from Pattimala hills in Kodagu, Karnataka).
- Labeo chekida:** Small, dark-bodied fish known locally as 'kaka chekida', inhabits **Chalakkudy river** (formed by confluence of five streams originating in Anamalai Hills of Western Ghats)
- Both are freshwater fish and endemic to river systems, highlighting **Western Ghats's role as biodiversity hotspot.**



REPTILES, INSECTS, AMPHIBIANS, ETC

Clinidium lalitae



Context:

- Scientists from the Zoological Survey of India (ZSI) identified a new species of beetle named **Clinidium lalitae**, in Talle Valley Wildlife Sanctuary, Arunachal Pradesh.



Characteristics:

- Belongs to subfamily **Rhysodinae**, unique morphology, a rare group of ground beetles inhabiting forest floors.
- Play a significant ecological role in **nutrient cycling and soil health**.

Lichens



Context:

- Study revealed certain lichen species could survive and remain metabolically active under simulated Mars-like conditions.



Distribution:

- 8% of land surface, including some most extreme environments on Earth like Antarctica, tropical deserts.
- India hosts over 2,700 species, rich in Western Ghats, Eastern Himalayas, and Northeast India.
- India's first **Lichen Park**, established in 2020 in **Munsiyari, Uttarakhand**.



Characteristics:

- Symbiotic association** between fungus (mycobiont) and an alga or cyanobacterium (photobiont).
- Bioindicators** of air pollution (especially SO₂ and heavy metals)
- First colonizers** in ecological succession, Pioneer species; Aids in soil formation.

Tardigrades (Water Bear/Moss Piglet)



Context:

- ▶ Indian astronaut Shubhanshu Shukla to take Tardigrades to International Space Station (ISS) for experiment.



Characteristics:

- ▶ Half a millimetre **long; eight-legged segmented micro-animal**.
- ▶ **Endure extreme hot/cold temperature** levels through cryptobiosis, crushing pressures and radiation and found worldwide.
 - ▶ **Cryptobiosis** is a state of extreme inactivity in response to adverse environmental conditions.



Two Recognized classes:

- ▶ Eutardigrada and Heterotardigrada (includes marine species).

Cicadas



Context:

- ▶ Cicadas have returned back in **Kerala's Silent Valley National Park**.



Characteristics:

- ▶ Occur in warm and temperate biomes.
- ▶ **All species** have a life cycle of three stages (**egg, nymph, and adult**).
- ▶ Adult females usually **lay eggs** in woody plant tissues.
- ▶ **Exceptionally loud song** produced in most species by the rapid buckling and unbuckling of **drum-like tymbals**.



PLANT SPECIES

Red Sanders (Red Sandalwood)



Context:

- National Biodiversity Authority sanctioned fund for Red Sanders Conservation under Access and Benefit Sharing (ABS) Mechanism.



About Red Sanders

- **Habitat:** Native to Southern Eastern Ghats of Andhra Pradesh.
 - Grows in dry deciduous forests between 150–900 meters altitude.
- Presence of red dye "Santalum" imparts its characteristic red colour.
- **Uses:** Fine furniture, musical instruments, ayurveda, yields a natural red dye.
- **Threats:** Illegal logging & smuggling.



Banana Musa Indandamanensis



Context:

- An infructescence of about 4.2 metres recorded in species of wild banana Musa indandamanensis, making it the **longest infructescence recorded** in bananas.
 - **Infructescence** is a group/cluster of fruits arranged on an axis/stem composed of a main stalk, and often having a complex arrangement of branches.



Discovery:

- First recorded from a **remote tropical forest** near Krishna Nala reserve forest in the **Andaman and Nicobar Islands in 2012**.



Characteristics:

- **Unique green flowers; fruit bunch lux** (axis) thrice size of regular banana species; **11 metres high** (usual banana species is 3-4 metres).



Benefits:

- Natural genetic resource for plant breeders to develop high yielding and disease resistant varieties.

White Himalayan Lily



Context:

- Uttarakhand Forest Department's latest report highlights conservation of **White Himalayan Lily**



About White Himalayan Lily (*Lilium polyphyllum*)

- Rare and fragrant lily species **native to Himalayan region**.
- Known for white or pink flowers with dark spots and stripes.
- **Rich in active chemical constituents** like alkaloids and furocoumarins.
- Used for treating haematemesis, bronchitis, rheumatism, etc.



Murikooti Pacha



Context:

- Indian researchers harnessed its wound-healing potential.



Distribution:

- **Native to Southeast Asia**, also found in other tropical regions **including India**.



Characteristics:

- **Red ivy plant**, also known as **Vranaropani** in Sanskrit.
- **Wound-healing pad** containing, **acteoside**, a natural compound known for therapeutic potential.

Arogyapacha



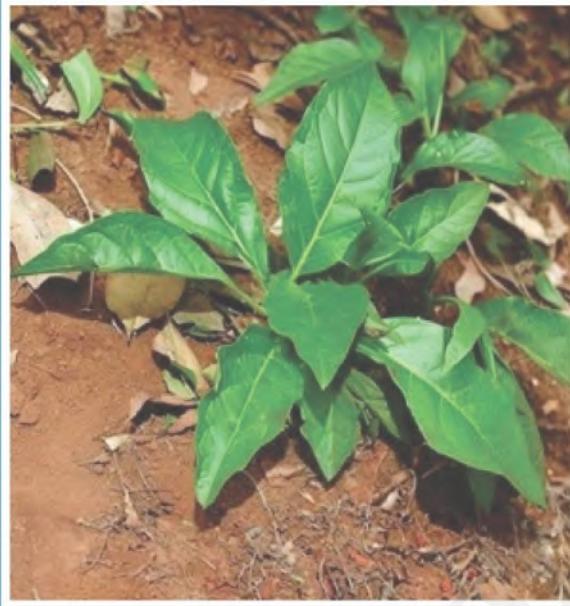
Context:

- ▶ Forest elder (**Kuttimathan Kani**) who revealed Arogyapacha died in Kerala.



About Arogyapacha (Meaning 'green that gives strength')

- ▶ A rare, indigenous medicinal plant of India.
- ▶ **Medicinal Properties:** Anti-oxidant, antistress, anti-microbial, anti-inflammatory, anti-tumor, anti-ulcer, anti-diabetic etc.
- ▶ Famous for **traditional use by Kani tribes**, in Agastya hills, Western Ghats.
- ▶ '**Jeevani**' Drug has been developed **using "Arogya Pacha"**
 - ▶ Kani Tribes gets a share of **50% on commercial returns**.



Conocarpus Trees



Context:

- ▶ Recently government-appointed panel recommended Supreme Court to ban **Conocarpus**. (Banned earlier by Gujarat and Tamil Nadu).



About Conocarpus Trees:

- ▶ **Has 2 species:**
 - ▶ One native to **coastal areas of tropical America**, and parts of West Africa.
 - ▶ Other found in arid coastal zones of Somalia and Yemen and across eastern and Northern Africa and Arabian Peninsula.
- ▶ **Ornamental plant** provides **green canopy, tolerant to heat, salinity, air, dust pollution** and needs minimal maintenance.
- ▶ Invasive (also known as green desert); excessive groundwater consumption; as allergenic pollen, etc.



Sea Buckthorn



Context:

- Its seeds grown in Ladakh are part of experiments on board the International Space Station flown by **NASA's Crew-11 mission.**



About Sea Buckthorn:

- Deciduous shrub/tree; Well-adapted to live in **cold areas of high altitude.**
- Significance:** Pioneer species for soil improvement, wind & sand control, and soil & water conservation; High nutritional value (vitamins; carotenoids; polyphenols, etc.,); Medicinal (antioxidant; anticancer, etc.)



Senna Spectabilis



Context:

- Kerala carried out India's first science-based, community-driven eradication of Senna Spectabilis in Wayanad.
 - Invasive species, Native to American tropicals.**
 - Forms** dense, sterile thickets, **choking out native plants, altering soil chemistry and depriving herbivores of food**, grows 7-18m tall.
 - Resembles **Kerala's state flower kanikkonna.**

