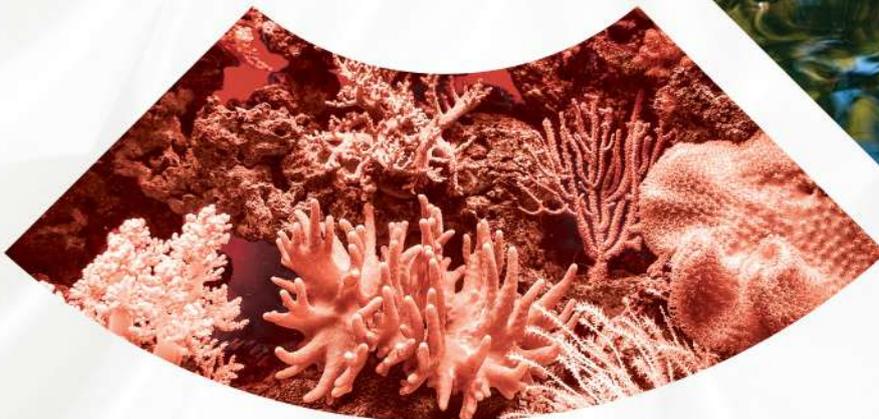


FORTUNE
Prelims Precise
Compilation
Volume I



**ENVIRONMENT &
ECOLOGY**

January 2025 - December 2025



Toppers in Top 100



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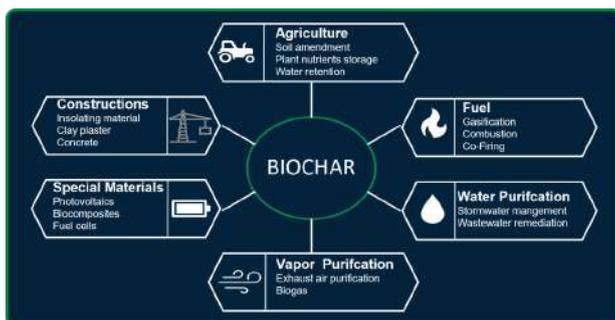
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POLLUTION & CONTAMINANTS (INCLUDING CHEMICALS, AIR/WATER/SOIL POLLUTION)

Remediating DDT-contaminated Soils

- Researchers have tested a method to **reduce DDT (dichlorodiphenyltrichloroethane) contamination** in soil using **biochar**.
- Biochar binds DDT, preventing its uptake by soil organisms, **reducing toxicity and bioaccumulation risks**.
- **Biochar** is a charcoal like material made from organic waste that's been partially burned in a limited amount of oxygen (**pyrolysis**).
- It's used as a **soil amendment** to improve plant health and store carbon.
- It is **highly porous, lightweight, with ~70% carbon**, plus nitrogen, hydrogen, and oxygen among others.
- DDT is linked to cancer, reproductive issues, and neurological problems.
- The **Stockholm Convention** on Persistent Organic Pollutants banned the use of DDT for agricultural purposes worldwide in 2001.
- **India** banned DDT for agriculture in **1972**.
- However, DDT is still permitted in small quantities for **malaria disease vector control** in countries that need it.



Rhodamine B

- Various states in India have banned the use of Rhodamine B in human consumables like cotton candy and gobi manchurian.
- **Rhodamine B** is a synthetic dye known for its bright pink hue, commonly utilised in industries such as textiles, paper, cosmetics, and leather.
- Its application **extends to scientific research** due to its fluorescent properties.

- Studies have indicated that Rhodamine B can induce DNA damage, which is a **precursor to cancer**.
- However, Rhodamine B is **not officially classified as a carcinogen** by the World Health Organization (WHO).
- **Rhodamine B** appears **green in its powdered form**, but when dissolved in water or another solvent, it turns **bright pink or fluorescent red**.
- **FSSAI** has banned the use of Rhodamine B in foods.
- Some of the **FSSAI approved synthetic colours** are Ponceau 4R, Carmoisine, ErythrosineZ, Tartrazine and Sunset Yellow FCF, Indigo Carmine and Brilliant Blue FCF, Fast Green FCF etc.

Organophosphate

- Doctors suspect **organophosphate poisoning** as the cause of 17 deaths in Jammu and Kashmir's Rajouri district.
- Organophosphates (OPs) are a class of chemicals that are used as **insecticides, herbicides, and nerve agents (chemical warfare)**.
- They are also used in the manufacturing of **plastics and solvents**.
- OPs are formed when **phosphoric acid and alcohol** are combined through an **esterification** process.
- **Atropine injections** are commonly used to treat organophosphate toxicity.

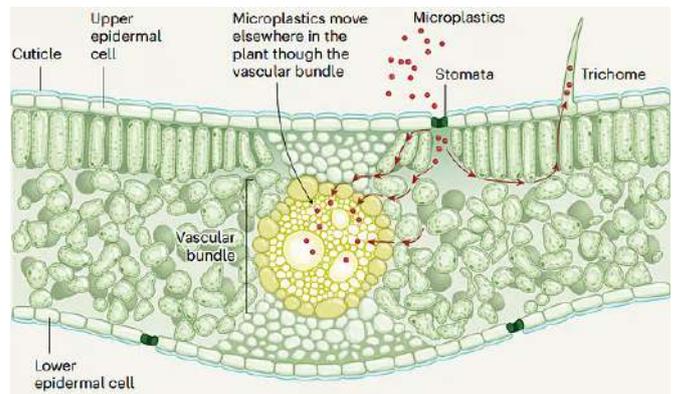
Nitrogen Pollution

- Studies show that humans are adding **reactive nitrogen** to the Earth's land surface each year through agriculture and industry adding to nitrogen pollution.
- While nitrogen makes up 78% of earth's atmosphere, plants cannot directly use nitrogen from the air because atmospheric nitrogen (**N₂**) is in a stable, inert form.
- Nitrogen is a key component of **proteins, DNA, and chlorophyll** of plants.

- Farmers add nitrogen-based fertilizers (**urea, ammonium nitrate**) to boost plant growth since they can absorb **nitrate (NO₃⁻) and ammonium (NH₄⁺)** from the soil.
- Livestock secretes **large amounts of nitrogen** in manure and urine.
- This nitrogen can volatilize as **ammonia (NH₃)** or leach into water sources as **nitrate (NO₃⁻)**, leading to pollution.
- Clearing forests for grazing or feed production or industry **disrupts natural nitrogen cycles** and increases nitrogen release.
- Nitrogen pollution causes **water and air pollution, biodiversity loss**, and climate change, while also harming human health through **respiratory problems and other ailments**.

Leaves Absorb Microplastics

- A study, published in the **journal Nature**, revealed that plant leaves can absorb microplastics and nanoplastics **directly from the air**.
 - ☞ This discovery marks the potential for these particles to enter the food chain.
- Microplastics are defined as plastic particles **measuring up to 5 millimetres in diameter**, while **nanoplastics are even smaller, less than 1,000 nanometres**.
- Plastic particles enter leaves through multiple pathways, including surface structures such as **stomata and the cuticle**.
- Stomata are **small pores formed by specialised cells**, while the **cuticle is a protective membrane coated in wax**, which makes it particularly conducive to absorbing microplastics.
- The study also found that **microplastics could travel through the plant's water and nutrient transport systems** to reach other tissues.
 - ☞ However, **trichomes that are hair-like appendages on cells** acted as 'sinks' that trapped external particles, thereby limiting the transport of plastics from leaves to roots.



Ozone Pollution & Food Security

- According to a study by the **Indian Institute of Technology (IIT) Kharagpur**, **surface ozone pollution is having a significant impact on India's major food crops**, particularly in the Indo-Gangetic Plain and central India.
- The study is titled '**Surface ozone pollution-driven risks for the yield of major food crops under future climate change scenarios in India**'.
- **Surface ozone is a strong oxidant** that damages plant tissues, leading to visible foliar injuries and reduced crop productivity.
- The study utilises data from the **Coupled Model Intercomparison Project phase-6 (CMIP6)** to assess both historical trends and future projections of ozone-induced yield losses.
- Findings indicate that under high-emission scenarios, **wheat yields could suffer an additional 20% reduction**, with **rice and maize experiencing losses of about 7%**.

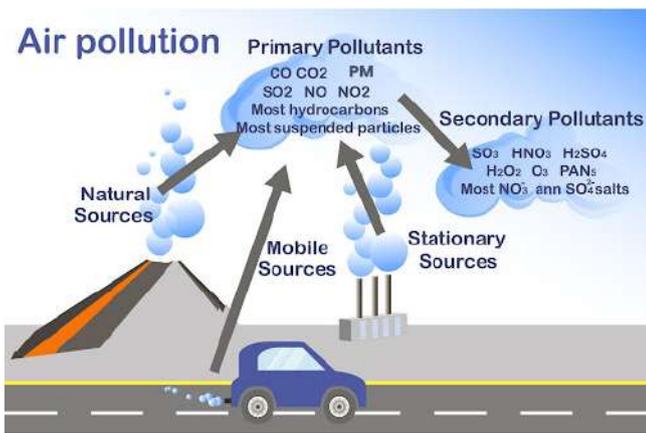
The Coupled Model Intercomparison Project (CMIP):

- It is a collaborative framework designed to improve knowledge of climate change.
- It was organized in 1995 by the Working Group on Coupled Modelling (WGCM) of the **World Climate Research Programme (WCRP)**.

Secondary Pollutant

- A recent study from the Centre for Research on Energy and Clean Air (CREA) reveals that **secondary pollutants are responsible for nearly one-third** of India's fine particulate matter (PM_{2.5}) pollution.

- **Primary pollutants** are released directly from sources like cars and factories.
 - When these pollutants rise into the atmosphere and **react with other gases** and water vapor, they form more complex and harmful particles known as secondary pollutants.
 - The study identifies **ammonium sulphate**, which forms from the reaction between sulphur dioxide (from coal plants) and ammonia, as a major secondary pollutant.
- ↪ This one compound accounts for about 34% of India's PM2.5.
- The primary source of the pollution-causing sulphur dioxide is **coal-fired power plants**.
 - Although it is mandatory for these plants to install **flue gas desulphurisation (FGD) systems** to clean their emissions, only about 8% of Indian plants have done so



- According to the study, the Wayanad Landslides were **Predictable** (e.g., Reports had flagged Wayanad slopes as unstable), **Visible** (e.g., heavy rainfall exceeding 600 mm in 48 hrs was modeled as a trigger), **Neglected** (Authorities fail to act due to complacency, politics, or economic interests), **High-Impact** (When triggered, it causes large-scale social, economic, and environmental damage) and **Actionable** (preventive action is possible if timely measures are taken).

Green Crackers

- Ahead of Deepavali, the Supreme Court **relaxed the blanket ban on fireworks in Delhi** and the National Capital Region (NCR).
- The SC allowed the sale of green fireworks technology transferred by the **CSIR-National Environmental Engineering Research Institute (NEERI)** and licensed by Petroleum and Explosives Safety Organisation (PESO).
- **Arjun Gopal v. Union of India, 2018**, first introduced the concept of green fireworks.
- Traditional firecrackers rely on **chemical mixtures of potassium nitrate, barium nitrate, aluminium powder, sulphur, and charcoal**.
- These compounds produce brilliant colours and loud bangs but also emit fine particulate matter (PM_{2.5} and PM₁₀), sulphur dioxide (SO₂), and nitrogen oxides (NO_x).
- Green crackers, branded as **SWAS (Safe Water Releaser)**, STAR (Safe Thermite Cracker) and SAFAL (Safe Minimal Aluminium), typically **replace barium nitrate with potassium nitrate** or strontium salts, limit aluminium content, and add compounds like zeolite and iron oxide to capture soot.
- **Barium**, which gives the green flame, is **highly soluble and toxic** to lungs and heart; reducing it in green crackers cuts airborne PM_{2.5} and PM₁₀ by 30–60%, though **trace aluminium, copper, and strontium remain**.

Grey Rhino Event

- Kerala's Wayanad landslide (July 2024) has been described as a "grey rhino event" by scientists in the report Sliding Earth, Scattered Lives.
- A **Grey Rhino event** is a big, obvious problem that is likely to happen but is **often ignored** until it becomes a crisis and causes catastrophic damage.
- It contrasts with "**black swan events**" (**rare, unpredictable**) and focuses on obvious but ignored risks.
- It is **coined by Michele Wucker**, a U.S.-based policy analyst, in her 2016 book The Gray Rhino: How to Recognize and Act on the Obvious Dangers We Ignore.

Graded Response Action Plan GRAP

- The Delhi government has invoked **GRAP Stage III** after the Air Quality Index (AQI) crossed **400 (Severe)**.
- The **Graded Response Action Plan (GRAP)** is a dynamic, stage-wise pollution control framework for Delhi-NCR, implemented by the **Commission for Air Quality Management (CAQM)** along with Central Pollution Control Board (CPCB), Delhi govt., and National Capital Region states (adjoining districts of Haryana, UP and Rajasthan).
- It ensures coordinated action aligned with **NCAP** targets.
- GRAP has four stages linked to AQI levels—**Stage I: Poor (201–300)**, **Stage II: Very Poor (301–400)**, **Stage III: Severe (401–450)**, **Stage IV: Severe+ (>450)**.

- The **Commission for Air Quality Management (CAQM)**, established in 2021 under the **Commission for Air Quality Management in National Capital Region and Adjoining Areas Act, 2021**, is a statutory body responsible for coordinating air pollution control across the NCR and nearby areas.

Fight against pollution
A look into the city's Graded Response Action Plan to fight air pollution

STAGE 1 MODERATE-TO-POOR QUALITY AIR (PM_{2.5} above 61µg/m³ or PM₁₀ above 101µg/m³)

- Mechanized sweeping, washing roads with water
- Enforcing ban on firecrackers, increased scrutiny of vehicles for pollution standards

STAGE 2 VERY POOR AIR (PM_{2.5} above 121 µg/m³ or PM₁₀ above 351 µg/m³)

- Ban on diesel generators
- Parking fee to surge by 3-4 times
- Stop use of coal/firewood in eateries
- Urge people with respiratory or cardiac problems to stay inside

STAGE 3 SEVERELY POLLUTED AIR (PM_{2.5} above 250µg/m³ or PM₁₀ above 430µg/m³)

- Increase frequency of road cleaning and washing
- Shut down of brick kilns
- Restrictions on operation of coal-based power plants in NCR

STAGE 4 EMERGENCY (also known as severe+ PM_{2.5} above 300 µg/m³ or PM₁₀ above 500µg/m³)

- Ban entry of trucks (except for essential items)
- Halt construction work
- Begin odd-even road scheme for private vehicles

BEGINNING FROM OCT 15
Some of these measures will already kick in from October 15. These are: **1 BAN ON DIESEL GENERATORS** | **2 WASHING OF ROADS** | **3 NIGHT PATROLS AT HOT SPOTS**

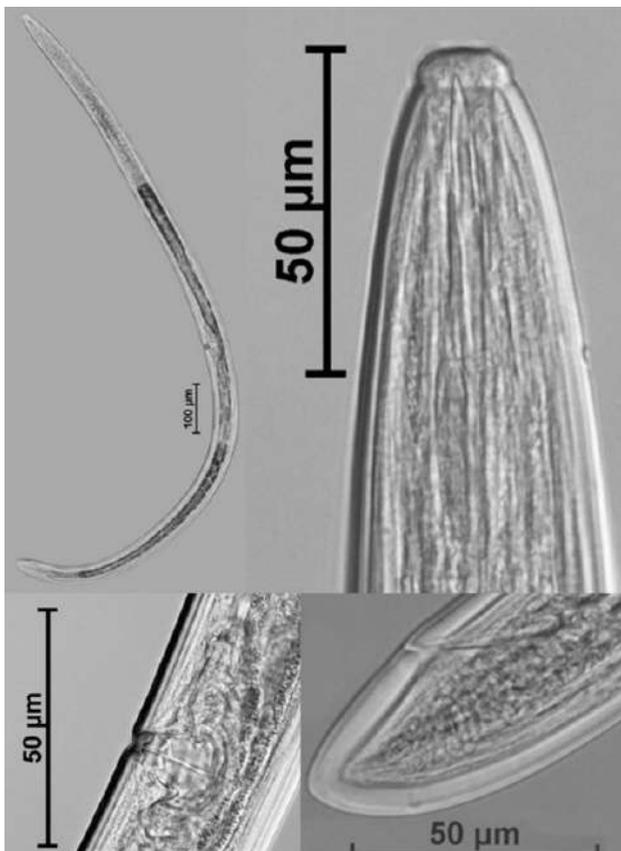
BIODIVERSITY & SPECIES CONSERVATION (INCLUDING NEW SPECIES, POPULATION, PROJECTS)

Bacterial Cellulose

- Researchers recently reported that **Bacterial cellulose can be used as a bandage to significantly improve healing and regeneration in plants.**
- Bacterial cellulose is a **natural polymer produced by certain bacteria.**
- It has thus far been widely used in human medicine, often for wound healing.
- The latest findings suggest **potential applications in agriculture**, such as facilitating grafting, preserving cut plant material, or serving as a growth medium in laboratories.
- To test the effectiveness of the patches as healing devices, the scientists made small cuts in the leaves of two common lab plants, ***Nicotiana benthamiana* and *Arabidopsis thaliana***, applying the “Band-Aids” to half the wounds.
- After one week, more than 80% of the treated wounds had healed completely, compared with less than 20% of the untreated ones.

Crassolabium Dhritiae

- Scientists from the Zoological Survey of India (ZSI), Kolkata, have announced the discovery of a **species of soil-dwelling nematode** in Odisha's Keonjhar district.
- The newly identified species, ***Crassolabium dhritiae***, is named in honour of Dr. Dhriti Banerjee, current director of ZSI, in recognition of her outstanding contributions to zoology and taxonomic research.
- A **nematode** is a roundworm belonging to the phylum Nematoda, an exceptionally diverse and abundant group found in nearly all habitats globally.
- *Crassolabium dhritiae* is characterised by its **medium-sized, slender body, rounded lip region**, wide odonto style, long pharynx, specific features in its female reproductive system, and a distinct tail shape.
- *Crassolabium dhritiae* brings the total number of known ***Crassolabium* species worldwide to 39**, with nine now recorded in India.
- These microscopic organisms are vital to **soil health and play a crucial role in nutrient cycling** and organic matter decomposition.



Asiatic Lion Population Surge in Gujarat 2025

- The population of Asiatic lions (*Panthera leo persica*) in Gujarat has **increased to 891 from 674** in 2020 according to the 16th census conducted recently.
- Recording an increase of 217 lions, around **32% compared to the 15th lion census**, the tally this time includes 196 males, 330 females, 140 sub-adults and 225 cubs.
- The number of adult **females has increased from 260 to 330 (26.92%)**, reinforcing the population's reproductive capacity.
- Until the 19th century, it lived across Saudi Arabia, eastern Turkey, Iran, Mesopotamia, and from eastern Pakistan to Bengal and central India. Since the early 20th century, its range has been limited to **Gir National Park & Gir and Pania Wildlife Sanctuary** and adjoining areas.
- Currently, there are only two recognized subspecies of lions: the vulnerable and genetically diverse **African lion (*Panthera leo leo*)** and the endangered **Asiatic lion (*Panthera leo persica*)**

Simlipal National Park

- The Odisha government recently notified the Similipal Tiger Reserve (STR), **the world's only home to wild melanistic tigers, as a national park.**
- It is the **107th national park** and the second in the eastern state, after Bhitarkanika.
- Similipal, located in Odisha's Mayurbhanj district, is home to **40 royal Bengal tigers**, shelter to **25% of Odisha's elephant** population and 104 orchid species, many endemic to the region.
- It is a haven for over 360 species of birds, and diverse mammals like leopards, sambar, and mugger crocodiles.
- The forests of Similipal are a **mix of sal trees, moist deciduous, and semi-evergreen types.**
- The tigers of Similipal possess **higher-than-normal levels of melanin**, giving them coats that are more black with yellow stripes.
- Due to their unique lineage, they may be accurately described as **pseudo-melanistic**

LEONINE FACTS

- ▶ Unlike African lions, male Asiatic lions do not live with the females
- ▶ The male Asiatic lion has a shorter, sparser and darker mane compare to the fuller mane of the African lion
- ▶ Asiatic lions are slightly smaller than African lions
- ▶ The most distinguishing characteristic of the Asiatic lion is the longitudinal fold of skin that runs along its belly. This is absent in African lions

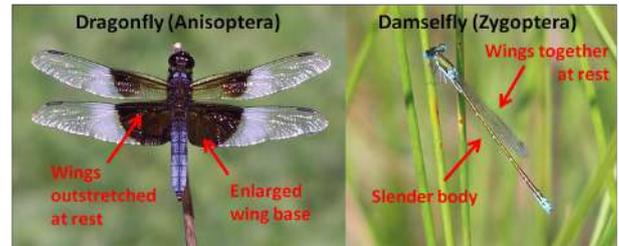
Poster issued by Gujarat Tourism

AviList

- AviList, the **first-ever unified global checklist of bird species**, became live recently after four years of work by the **Working Group on Avian Checklists**.
- The Working Group is an international **group of representatives** from BirdLife International, the Cornell Lab of Ornithology, the International Ornithologists' Union, the American Ornithologists' Society, and Avibase.
- The new checklist will **replace** the International Ornithological Committee (IOC) World Bird List and Clements lists and **will be a uniform list** which will be **updated annually**.
- AviList **supports** ornithologists, birdwatchers, conservationists, researchers, and policymakers globally and covers 11,131 bird species and 19,996 subspecies,
- The new checklist is published freely at <https://www.avilist.org/>. and can be downloaded in full for free.

Dragonfly Surge in Delhi

- Recent surveys across **seven Delhi Development Authority (DDA) biodiversity parks** reveal rise in **dragonfly and damselfly populations**.
- The survey covered seven DDA biodiversity parks of Yamuna, Aravalli, Neela Hauz, Tilpath Valley, Kamla Nehru Ridge, Tughlaqabad, and Kalindi.
- Dragonflies and damselflies are **bioindicators of wetlands** or species whose presence tracks wetland health.
- Their **larval stages require clean, well-oxygenated water**, and both larvae and adults are voracious mosquito predators.
- A single dragonfly is reported to **eat 30-100 mosquitoes per day**, underscoring its importance especially after floods.
- Delhi is known to host about **51 species of odonates (dragonflies and damselfies)**.
- Odonatas are characterised by large round heads, compound eyes, two pairs of long, transparent wings and elongated abdomens.



Great Barrier Reef (GBR) Coral Decline



- According to a recent survey by the **Australian Institute of Marine Science (AIMS)**, Australia's Great Barrier Reef (GBR) has recorded its worst annual coral decline in nearly four decades, mainly **due to severe mass bleaching in 2024**.
- The GBR is a **UNESCO World Heritage site** and located in the **Coral Sea** off the coast of Queensland, Australia.
- Coral bleaching is when corals **become white** due to the **loss of symbiotic algae** and photosynthetic pigments, causing coral polyps to **expel the zooxanthellae** that live inside their tissue, causing the coral to turn white.
- The widespread mass bleaching of the Great Barrier Reef was **first seen in 1998** and happened again in **2002, 2016, 2017, 2020, 2022 and 2024**

Key Findings:

- They surveyed 124 reefs across the northern, central, and southern GBR of these reefs, **48% showed a decline in hard coral cover**, 42% showed no net change, and **only 10% showed an increase**.
- In some locations, hard coral cover fell by more than 70%, marking the sharpest decline since long-term monitoring began in 1986.

- The northern GBR, **average coral cover dropped from 39.8% to 30%**, a 24.8% decline, particularly around Lizard Island, which experienced the worst heat stress on record.

Sea of Galilee turns red



- Recently, the Sea of Galilee in **Israel** has turned red due to the bloom of **Botryococcus braunii** algae.
- It is a **large freshwater lake** situated in the northeastern part of Israel and considered as the **lowest freshwater lake on the planet** and the **world's second-lowest lake after the Dead Sea**.
- Botryococcus braunii is a species of **single-celled green algae** found in freshwater or brackish lakes under the Chlorophyta group.
- It produces **carotenoid pigments** that turn **red in sunlight** which is the cause of red colour in the sea of galilee.
- Climate change-induced warming and nutrient-rich waters (phosphorus, nitrogen) are the causes for triggering the blooming of the algae.
- While **it is not harmful to humans**, blooms can block sunlight underwater, cause **hypoxia** upon decomposition, and disrupt aquatic ecosystems.

Dugong Conservation Reserve

- India's first Dugong Conservation Reserve in **Palk Bay, Tamil Nadu** (448.34 sq. km) was officially **recognized by IUCN**.
- Established in **2022 under the Wildlife Protection Act, 1972**, it hosts 12,250 hectares of **seagrass meadows**, vital for dugong feeding, carbon storage, and marine biodiversity.
- Dugong (*Dugong dugon*): Marine herbivores called "**sea cows**," feeding exclusively on seagrass.

- They give birth to **large young, live up to 70 years**, and have no adult predators.
- Dugongs are **sirenians**, related to manatees and elephants, found in **coastal waters from east Africa to Australia**.
- IUCN Status: Vulnerable.



National Camel Sustainability Initiative (NCSI)

- The **Ministry of Fisheries, Animal Husbandry and Dairying** plans the **National Camel Sustainability Initiative (NCSI)** to curb India's declining camel population, which fell from 11 lakh in 1977 to 2.5 lakh in 2019.
- India is home to several camel breeds, including Bikaneri, Jaisalmeri and Mewari in Rajasthan's Thar Desert, and Kachchhi and Kharai in the Rann of Kutch in Gujarat.
- Ladakh also **supports Critically Endangered two-humped Bactrian camels**.
- In fact, the population decline has been rapid in recent years: even in **2013, there were around 4 lakh camels in India**.
- The NCSI is prepared in consultation with the Food and Agriculture Organization (FAO).
- **Key recommendations** include **securing grazing rights**, expanding and **certifying camel milk markets**, strengthening dedicated camel health and veterinary services, and reforming restrictive legal barriers like the **Rajasthan Camel Act** to balance conservation with livelihood rights.

Coral Larvae Cryobank



- The **Philippines** has launched **Southeast Asia's first coral larvae cryobank**.
- A **cryobank** is a facility where biological materials — like cells, tissues, seeds, or in this case, coral larvae — are preserved at **extremely low temperatures** using liquid nitrogen or other cryogenic methods.
- The facility in the Philippines will freeze and **preserve coral “seeds” for reef restoration**, as part of a regional network linking institutions in the **Coral Triangle** — a 5.7 million sq. km marine biodiversity hotspot spanning **Indonesia, Malaysia, Papua New Guinea, the Philippines, Solomon Islands, and Timor-Leste**.
- Home to most of the world's coral species, a third of reef fish, mangroves, and six marine turtle species, the Triangle supports 120 million people.
- With **14% of corals lost between 2009–2018**, scientists warn that 70–90% could vanish by 2050 without urgent climate action.

'23for23' Initiative

- On 23 October, **International Snow Leopard Day** was observed with the '#23for23' initiative, encouraging 23 minutes of activity to raise awareness about snow leopard conservation.
- The campaign, initiated by the Bishkek based **Global Snow Leopard and Ecosystem Protection Program (GSLEP)** and the Washington based Snow Leopard Trust, aims to raise global awareness of snow leopards and their mountain ecosystems.
- GSLEP is an alliance of all **snow leopard range countries**, NGOs, multilateral institutions, scientists, and local communities dedicated to the conservation of snow leopards.

- The **snow leopard (panthera uncia)** inhabits mountains of Central and South Asia.
- Apart from India, snow leopards are found in Bhutan, Afghanistan, China, Kazakhstan, Kyrgyzstan, Mongolia, Pakistan, Nepal, Russia, Tajikistan, and Uzbekistan—the largest share is in the Tibetan plateau of China, followed by Mongolia and India.
- The recently concluded first-ever **Snow Leopard Census** of India recorded **718 individual snow leopards** across the Indian Himalayas, with **Ladakh alone hosting 477**.
- The species is listed as **globally Vulnerable on the IUCN Red List**.

Elephant Estimation (SAIEE)

- The Synchronous All India Elephant Estimation (**SAIEE**) 2021–25, was completed by the **Union Environment Ministry and Wildlife Institute of India (WII)**.
- It reported 22,446 elephants in India, primarily concentrated in the Western Ghats and the hills and plains of the Northeast.
- **Karnataka** hosts the largest population (6,013), followed by **Assam** (4,159), **Tamil Nadu** (3,136), **Kerala** (2,785), **Uttarakhand** (1,792), and **Odisha** (912).
- The **Western Ghats alone account for over half** of India's elephants (11,934).
- Compared to 2017 estimation, the population declined by 18%, but scientists associated with the survey say that the **new survey establishes a new scientific baseline** for future monitoring and conservation planning.
- The survey conducted as part of **Project Elephant** took four years to complete and used a **three-phase process** combining ground surveys using M-Stripes app, satellite-based mapping and DNA genetic analysis.
- India is **home to more than 60% of the world's remaining Asian elephants**.
- Asian Elephants are listed as **Endangered** on the IUCN Red List.

IUCN Species Survival Commission (SSC)

- Vivek Menon (founder and CEO of the **Wildlife Trust of India**) became the first Asian chairman of the IUCN Species Survival Commission (SSC).
- SSC is the **largest IUCN scientific network** with over 10,000 volunteers.
- Established in **1949**, the SSC works with governments, NGOs, and researchers to prevent species extinction, support recovery, promote sustainable use of biodiversity, and integrate science with policy and action.

- It also conducts **assessments** classifying species as Critically Endangered, Endangered, Vulnerable, etc..



PROTECTED AREAS, WETLANDS & RAMSAR SITES

Wetland City Accreditation (WCA)

- **Indore and Udaipur** have become the **first two Indian cities** to join the Wetland City Accreditation (WCA) under the **Ramsar Convention on Wetlands**.
- WCA is a **voluntary scheme** established under **12th Conference of the Parties (COP12)** to the Ramsar Convention of 2015 held in Uruguay.
- The city is notified based on **6 criterias** which includes presence of a Ramsar site, measures

for wetland and ecosystem conservation, wetland restoration measures, proper land-use planning, local participation and awareness creation.

- ➔ **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.
- The **accreditation is for 6 years** and will have to be renewed

New Ramsar Sites

- India has added four new wetlands to the Ramsar List of Wetlands of International Importance, announced on **World Wetlands Day (February 2)**.
- The country now has 89 of these sites, making it the nation with the **most Ramsar sites in Asia** and the **third highest number of such sites in the world**.
- **Tamil Nadu has the most number of Ramsar sites** in India, 20 in number.
- India's new Ramsar sites include **Sakkarakottai Bird Sanctuary** and **Therthangal Bird Sanctuary** in Tamil Nadu, **Khecheopalri Wetland** in Sikkim and **Udhwa Lake** in Jharkhand.

👉 This marks a significant milestone for Sikkim and Jharkhand, as they have secured their first-ever Ramsar sites.

Site	Species	Importance
Sakkarakottai Bird Sanctuary & Therthangal Bird Sanctuary	Spot-billed Pelican, Black-headed Ibis, and Oriental Darter	Lie along the Central Asian Flyway

Khecheopalri Wetland	Great Barbet Long-tailed Shrike Green-backed Tit Rufous Sibia and Fish Cyprinus carpio (Common Carp) and Danio aequipinnatus (Giant Danio).	Originally known as Kha-Chot-Palri , meaning “the heaven of Padmasambhava”. It is considered sacred by both Buddhists and Hindus and is believed to be a wish-fulfilling lake.
Udhwa Lake	Near threatened Black-necked stork (Ephippiorhynchus asiaticus), Critically Endangered Oriental white-backed vulture (Gyps bengalensis), Lesser adjutant (Leptoptilos javanicus).	The Sanctuary is an Important Bird Area . It is connected to the Ganga River through a 25 km long water channel known as the Udhuwa Nala, at Farakka .

Menar and Khichan Ramsar Site

- India has added two new Ramsar Sites— **Menar** (Udaipur) and **Khichan** (Phalodi) in **Rajasthan**, raising the total to **91 wetlands of international importance**
- The Menar Wetland Complex** is a freshwater monsoon wetland complex formed by three ponds, **Braham talab, Dhand talab and Kheroda talab**, and agricultural land that connects the latter two.
 - The notable bird species at the site are the **critically endangered white-rumped vulture and long-billed vulture**.
- Khichan Wetland**, located in the northern Thar Desert, comprises two water bodies, **Ratri nadi (river) and Vijaysagar talab (pond)**, riparian habitat and scrub land.
 - The site is especially recognised for hosting large wintering flocks of **migratory demoiselle cranes**, making up over 22,000 individuals each year.



The Ramsar Convention:

It is an intergovernmental treaty signed in **1971 in Ramsar, Iran**.

It encourages the protection and conservation of wetlands worldwide by designating them as such.

Ramsar sites are also known as wetlands of international importance.

According to the Convention, wetlands are defined as “areas of marsh, fen, peatland or water, whether natural or artificial, permanent or temporary, with water that is static or flowing, fresh, brackish or salt, including areas of marine water the depth of which at low tide does not exceed six metres”.

NDMA’s New Approach to Landslide Management

- The National Disaster Management Authority (NDMA) is planning to adopt the **3Ms—mapping, monitoring, and mitigation**—to improve management of landslide-related disasters.
- This is in response to **changing rainfall patterns and rising instances** of floods and landslides.
- These efforts **aim to achieve the 3Rs**: resilient recovery, rapid response, and risk assessment.
- Climate change is projected to **increase the intensity of extreme rainfall events** in India by 43% by 2030, making the country hotter and wetter.

- A **landslide refers to** the movement of rock, debris, or earth down a slope, and is a form of mass wasting driven by gravity.
 - **Factors** like heavy rainfall, snowmelt, water level changes, groundwater shifts, earthquakes, volcanic activity, and human disturbance can trigger landslides.
 - Similar movements can also occur underwater, known as submarine landslides.
 - NDMA is the **apex body** in India for **disaster management**, established under the **Disaster Management Act, 2005** and is headed by the **Prime Minister**

Orans

- The Supreme Court had last year directed Rajasthan to **map and classify “orans” (sacred groves) as forests**.
- Orans are **the sacred groves of Rajasthan** that are deeply revered by local communities as ‘forests’.
- Orans also known as **‘malvan’, ‘deo ghat’, and ‘baugh’**, number around 25,000 and cover about six lakh hectares of the State.
- By augmenting **tree and grass cover, orans trap surface runoff** and support in-situ rainwater harvesting.
- According to the study, **41% livestock** is dependent on Orans in Barmer district of Rajasthan.

T.N. Godavarman:

In **T.N. Godavarman v. Union of India**, the Supreme Court ordered that ‘forest land’ in Section 2 of the Forest (Conservation) Act, 1980, “will not only include ‘forest’ as understood in the dictionary sense, but also **any area recorded as forest in the government record irrespective of the ownership of the land**”.

Sacred Groves of India:

India has the highest number of sacred groves in the world.

They are called **‘devara kadu’** in Karnataka, ‘devban’ in Himachal Pradesh, ‘kavu’ and ‘sarpa kavu’ in Kerala, ‘sarna’ in the Chota Nagpur Plateau region, ‘devbani’ in Chhattisgarh, ‘jahera’ or ‘thakuramma’ in Odisha, **‘devgudi’** by the Muria, the Madia, and the Gond adivasis of Maharashtra and Chhattisgarh, **‘ki law lyngdoh’**, ‘ki law kyntang’ or ‘ki law niam’ in Meghalaya, **‘sabarkantha’**, ‘dahod’ or ‘banaskantha’ in Gujarat, and so forth.

Matri Van initiative

- Recently, the Union Minister for Environment, Forest and Climate Change, along with the Union Minister for Housing and Urban Affairs launched the ‘Matri Van’ initiative, a project under the **‘Ek Ped Maa Ke Naam’ campaign**.
- The initiative is a **theme-based urban forest project** spanning 750 acres in the **Aravalli Hills**, being developed in Gurugram, Haryana.
- It is envisioned as a **unique ecological and cultural space** that will contribute to biodiversity, public well-being, and urban sustainability.
- This vision would be achieved through a **multi-stakeholder collaboration** involving CSR partners, Resident Welfare Associations (RWAs), NGOs, multinational corporations (MNCs), school children and government organizations.
- The main components of the ‘Matri Van’ would include removal of existing bushes like **Kabuli Kikar (Prosopis juliflora)** and plantation of Native Trees.
- And it would further include nature trails, cycle track, yoga places, sitting places/gazebos, public facilities, etc

Swachh Vayu Survekshan 2025

- **Swachh Vayu Survekshan (SVS) 2025** ranked Indian cities on air pollution mitigation under the **National Clean Air Programme (NCAP)**, conducted annually by **MoEFCC**.
- **Indore** topped the million-plus category, followed by Jabalpur and Agra/Surat; **Amravati** led the 3–10 lakh population category, and **Dewas** topped cities under 3 lakh.
- PM10 levels declined in 103 of 130 cities, with **Mumbai (44%)**, Kolkata (37%), Hyderabad/Bengaluru (26%), Delhi (15%), and Chennai (12%) recording significant reductions.

SVS evaluates cities on **ambient air quality (PM2.5/PM10), emission sources and control measures, implementation of Graded Action Plans, air quality monitoring infrastructure, pollution mitigation initiatives, and public awareness/participation**.

Swachh Survekshan Awards 2024-25

- Recently the President of India conferred Swachh Survekshan Awards 2024-25 hosted by the **Ministry of Housing and Urban Affairs (MoHUA)** in the theme “**Reduce, Reuse, Recycle (3R)**”.
- Swachh Survekshan** is a flagship initiative under **Swachh Bharat Mission-Urban (SBM-U)** which played a pivotal role in driving cleanliness in urban India, engaging communities, changing mindsets, and motivating action for the past nine years

New updates in Framework:

- A new **Super Swachh League (SSL)** was created for consistently high-performing cities.

- Cities are now classified in five population categories (Very Small, Small, Medium, Big, Million-Plus), enabling equitable comparison across similarly sized urban areas.

Key Highlights:

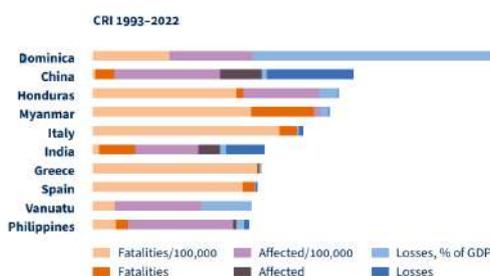
- Indore, Surat, and Navi Mumbai once again secured India’s cleanest cities award under newly introduced “**Super Swachh League**”.
- Ahmedabad, Bhopal, and Lucknow were declared the new generation of top clean cities, emerging as India’s leading **Swachh Shehars**.
- Prayagraj** was honoured as the Best Ganga Town, while **Secunderabad Cantonment Board** was awarded for its strong sanitation efforts

CLIMATE CHANGE, GLOBAL WARMING & RELATED RISKS/INDICES

Climate Risk Index 2025

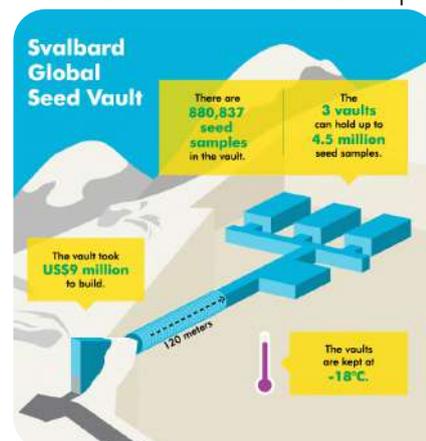
- India ranks sixth** among the top 10 countries most affected by extreme weather from 1993-2023, according to the **Climate Risk Index (CRI) by NGO Germanwatch**.
- The findings of the report are based on extreme weather event data from the International Disaster Database (Em-dat) and socio-economic data from the International Monetary Fund (IMF).
- India faced over 400 extreme events**, including major cyclones (Gujarat 1998, Odisha 1999, Amphan 2020), devastating floods (1993, 2013, 2019), and deadly heat waves (1998, 2002, 2003, 2015).
- These events caused **\$180 billion in losses and at least 80,000 deaths**.

Figure 1: The 10 countries most affected in 1993-2022



Svalbard Global Seed Vault

- The **Svalbard Global Seed Vault** was recently in the news due to new seed deposits from multiple countries, reinforcing its role in global food security.
- Located on **Spitsbergen Island in Norway’s Svalbard archipelago**, it is built into a mountainside about **120 meters deep** to protect against natural and human-made disasters.
- Positioned **1,300 km from the North Pole**, it benefits from **permafrost** conditions that help naturally preserve seeds.
- The vault stores **backup seed samples** from around the world, covering over **1.2 million seed varieties** from **almost every country**.
- These include essential food crops such as **rice, wheat, maize, barley, lentils, and sorghum**, as well as wild relatives and traditional crop varieties.



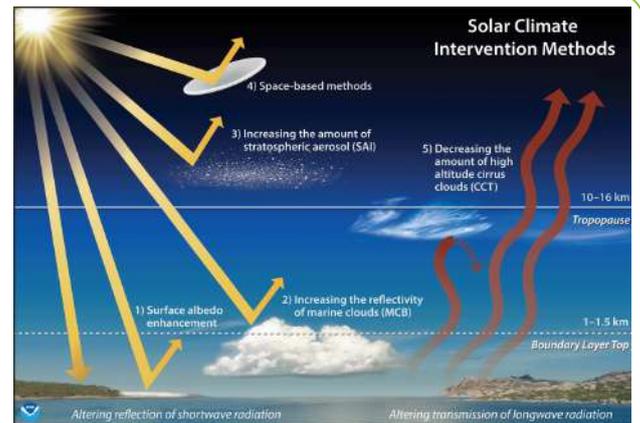
Loss and Damage Fund

- The United States recently announced its intention to **withdraw from the United Nations' fund to respond to loss and damage.**
- “**Loss and damage**” refers to the adverse consequences brought about by climate change, and resulting in **a range of impacts, such as loss of human lives, damage to infrastructure** and buildings, loss of property and crops, as well as the deterioration of ecosystems.
- These impacts extend **beyond the purely economic realm** to encompass a broader spectrum of both economic and non-economic losses.
- While the fund was **officially established at the 2022** United Nations Climate Change Conference in Egypt, known as COP27, it was **operationalized this past year at COP29 in Azerbaijan.**
- An executive director of the fund was appointed and initial financing agreements with the **World Bank** were finalized.
- United Nations Development Program (UNDP)** serves as a member of the Technical Support Unit advising the UNFCCC with respect to the Fund.

Climate Physical Risks

- The World Bank states **over 80% of India's population** lives in districts vulnerable to climate-induced disasters.
- Climate Physical risk (CPR)** refers to potential damage and disruption to people, property, and productivity from climate hazards like floods, droughts, and wildfires.
- This causes **direct costs such as repairs and indirect costs** like supply chain disruptions.
- Over time, assets may lose value and become uninsurable.
- According to the **Intergovernmental Panel on Climate Change (IPCC)**, climate risk depends on **hazard, exposure** (who/what is at risk), and **vulnerability** (ability to withstand and recover), together defining the full risk scale.
- ★ The IPCC is a United Nations body established in **1988** to assess scientific information related to climate change

Stratospheric Aerosol Injection



- A recent study proposes a more **affordable and practical method** for Stratospheric Aerosol Injection (SAI).
- SAI is a **climate engineering technique** that involves injecting aerosols into the **stratosphere** (approx 10 to 50 km above MSL) to reflect sunlight and cool the planet.
- Traditionally, SAI required **special high-altitude jets** at ~20 km.
- The new approach uses **modified commercial planes** to release **12 million tonnes of sulphur dioxide** at **13 km altitude**, possibly lowering global temperatures by **about 0.6°C**.
- The **benefits** include rapid cooling, temporary relief from climate change, and lower costs using existing aircraft.
- However, it remains **controversial** due to its global side effects, potential disruption of weather patterns, risk of unilateral deployment, and uncertain long-term ecological and health impacts

Antarctic Ozone Hole Shrinks



- NASA scientists report that the **2025 Antarctic ozone hole has improved**, ranking as the fifth smallest since 1992, averaging 18.71 million sq km.

- This recovery is attributed to the long-term success of the **Montreal Protocol**, a 1987 global treaty that **phased out ozone-depleting substances** like Chloro Fluro Carbons, used in products like refrigerators and aerosols and has been universally ratified..
- The **ozone layer** in the stratosphere acts as a shield against harmful UV rays, protecting crops and human health from skin cancer and cataracts.
- Ozone holes form over polar regions due to **depletion of stratospheric ozone by chlorine and bromine** from CFCs and halons.
- Extremely low winter temperatures **create polar stratospheric clouds**, enabling reactions that **convert halogens into ozone-destroying forms**, while the stable **polar vortex** traps them.
- When **spring sunlight returns**, UV activates these halogens, rapidly depleting ozone.
- **Antarctica sees a larger hole** due to colder temperatures and a stronger vortex, whereas the Arctic is warmer with a disrupted vortex, so depletion is milder.

Climate Change Performance Index (CCPI) 2026

- India has slipped from **10th to 23rd** in the latest **Climate Change Performance Index (CCPI)**, published by **Germanwatch**, **New Climate Institute**, and **Climate Action Network International**.
- The index evaluates countries across **GHG emissions, renewable energy, energy use, and climate policy**.
- Denmark topped the rankings, followed by the UK and Morocco.
- India fell from a **high** to **medium performer** due to being one of the world's largest producers of oil, gas, and coal.
- It scored **medium** in emissions, policy, and energy use, but **low** in renewable energy. Among G20 nations, **China (54th)**, **Russia (64th)**, **the US (65th)**, and **Saudi Arabia (67th)** ranked among the worst performers.

UN Water Convention



WATER
CONVENTION



- Bangladesh has become the **first South Asian country** to join the **UN Water Convention (2025)**, which strengthens cooperation on transboundary water management.
- The **UN Water Convention** (formally **Convention on the Protection and Use of Transboundary Watercourses and International Lakes**) is a **legally binding global treaty**.
- It promotes the **sustainable and cooperative management of shared rivers, lakes, and groundwater** between countries.
- It was adopted in Helsinki in 1992 and entered into force in 1996 and is served by **The United Nations Economic Commission for Europe (UNECE)**.
- Originally regional, the Convention became open to **all UN member states after 2016**, encouraging but not replacing specific bilateral or multilateral water treaties.
- India has **not signed or ratified the UNECE Water Convention** primarily because it favors **bilateral diplomacy** to resolve water issues and due to concerns about sovereignty and federal structure limitations.

The **UNECE** is one of five regional commissions under the UN's Economic and Social Council (**ECOSOC**), established in 1947 to promote pan-European economic integration and cooperation. UNECE has **56 members** that includes countries from Europe, North America, former Soviet Republics and Israel.

INTERNATIONAL CONVENTIONS, ALLIANCES & SUMMITS

International Big Cat Alliance (IBCA)

- The **International Big Cat Alliance (IBCA)** recently became a treaty-based intergovernmental organization.
- Launched by **India in 2023 on Project Tiger's 50th anniversary**, IBCA aims to conserve **seven big cats**: Tiger, Lion, Jaguar, Leopard, Snow Leopard, Puma, and Cheetah.
- Though Puma and Cheetah are not part of **Panthera**, they are included in big cat listings.
- Besides range countries, IBCA includes **non-range countries**, conservation partners, and scientific organizations.
- With Liberia as the fifth signatory, alongside India, Nicaragua, Eswatini, and Somalia, the agreement has come into force.
- India serves as the **depository**, and 27 countries have consented to join.

Big Cats	IUCN Status	Schedule (WPA, 1972)
Tiger (Panthera tigris) 	Endangered	Schedule 1
Cheetah (Acinonyx jubatus) 	Asian – Critically endangered African – Vulnerable	Schedule 1 Schedule 1
Leopard (Panthera pardus) 	Vulnerable	Schedule 1
Lion (Panthera leo) 	Vulnerable	Schedule 1
Snow Leopard (Panthera uncia) 	Vulnerable	Schedule 1
Jaguar (Panthera onca) 	Near Threatened	–
Puma (Puma concolor) 	Least Concern	–

Kyoto Protocol (1997)

- Recently, the International Court of Justice (ICJ) has clarified that the Kyoto Protocol (1997) remains **legally valid and binding**, even after the Paris Agreement (2015) came into effect which revives the legal status of Kyoto protocol.
- The Kyoto Protocol, the **first international treaty to set legally binding targets to cut greenhouse gas emissions** was **adopted in 1997**, in Kyoto, Japan.
- It **entered into force in 2005** under the UN Framework Convention on Climate Change (UNFCCC) and based on the principle of **Common but Differentiated Responsibilities and Respective Capabilities (CBDR-RC)**.
- CBDR puts the obligation to reduce current emissions on developed countries on the basis that they are historically responsible for the current levels of greenhouse gases in the atmosphere.
- The **Protocol targeted 6 greenhouse gases**: carbon dioxide, Methane, nitrous oxide, Hydrofluorocarbons, Perfluorocarbons, sulfur hexafluoride and **had two commitment periods: 2008–2012 and 2012–2020**.
- And it classified the parties of the protocol into **Annex I** - Developed countries + Economies in transition (EIT), **Annex II** - Developed countries (Annex II is a subset of Annex I), **Annex B** - Annex I Parties with first or second-round Kyoto greenhouse gas emissions targets, **Non-Annex I** - Parties to the UNFCCC not listed in Annex I of the Convention, **LDCs** - Least-developed countries with no binding targets to reduce GHG emissions.
- Key Obligations:
 - Emission reductions by Annex-I countries (from 1990 baseline).
 - Finance and technology transfer to developing nations.
 - Creation of mechanisms like Clean Development Mechanism (CDM).
- But later Annex I countries exited or stopped complying to the protocol leading to malfunctioning of the protocol.

International Solar Alliance (ISA)

- India recently hosted the **8th International Solar Alliance (ISA) Assembly** in New Delhi.
- **ISA, launched in 2015 by India and France during COP21**, is a global intergovernmental organisation promoting solar energy, climate resilience, and energy access.
- It has 125 member countries and is headquartered in Gurugram, Haryana.
- Key highlights include the **SUNRISE initiative for solar recycling**, the **One Sun One World One Grid (OSOWOG) programme** for global solar interconnections, the **Global Capability Centre in India**.
- ISA releases **Five key reports**: Ease of Doing Solar 2025, Solar PV Skills and Jobs in Africa, Solar Compass: Special Issue on Integrated Photovoltaics, Global Floating Solar Framework, and Global Solar Trends & Outlook 2025.
- Membership in the **International Solar Alliance (ISA)** is open to:
 1. **Member countries**: Any **sovereign country that is a member of the United Nations** and falls **between the Tropic of Cancer and the Tropic of Capricorn** (i.e., countries with a solar resource-rich tropical zone).
 2. **Signatory countries**: Other countries outside the tropics can also join as **signatories**, contributing to ISA's objectives and participating in its programmes

CITES convention

- A committee of **Convention on International Trade in Endangered Species of Wild Fauna and Flora (CITES)** has recommended India pause permits for importing endangered animals to zoos and rescue centres.
- The CITES, **adopted in 1973 and effective from 1975** with 185 members including **India (since 1976)**, is an international agreement ensuring that trade in wild animals and plants does not threaten their survival.
- Administered by the **United Nations Environment Programme (UNEP)** in Geneva, it is **legally binding** but implemented via national laws, with member nations reviewing species every 2–3 years at the **Conference of**

the Parties (COP).

- Species are listed in three appendices: **Appendix I** (threatened with extinction, trade prohibited), **Appendix II** (not yet threatened but regulated trade allowed), and **Appendix III** (species a country seeks help to control trade), with trade regulated through permits and certificates.

CITES APPENDICES		
Appendix I Commercial international trade is generally prohibited 704 species & 30 subspecies of animals 395 species, 4 subspecies, & 12 varieties of plants 	Appendix II Commercial and non-commercial international trade is allowed through issuance of permits and certificates 5,466 species & 16 subspecies of animals 33,764 species of plants 	Appendix III Commercial and non-commercial international trade is allowed; complements domestic measures to control trade 372 species & 22 subspecies of animals 134 species & 1 variety of plants 

COP30 – UN Climate Summit 2025

- The **30th Conference of the Parties (COP30)** to the **UN Framework Convention on Climate Change (UNFCCC)** was held in Belém, Brazil, marking a decade since the Paris Agreement.
- COP30 reviewed Paris Agreement progress, strengthened emission targets, and negotiated finance and adaptation frameworks.

Key initiatives include

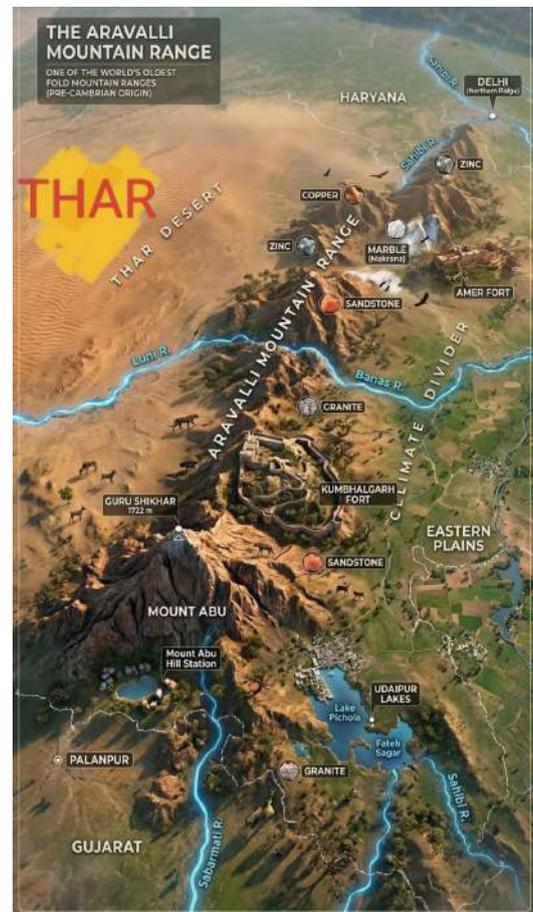
- Belém Package** (29 decisions to accelerate global climate action),
- Just Transition Mechanism** (support for economies moving from fossil fuels),
- Global Implementation Tracker and Belém Mission to 1.5°C** (monitoring each country's Nationally Determined Contribution (NDC) alignment)
- Belém Health Action Plan** (help countries build climate-resilient and low-carbon health systems.)
- Tropical Forests Forever Facility** (incentives for forest conservation)
- New Collective Quantified Goal** (commitment to scale global climate finance toward \$1 trillion per year by 2035),

↪ **Global Goal on Adaptation** (measurable resilience targets)

↪ **Belém 4x Pledge** (quadruple sustainable fuel use by 2035).

- Turkiye** will host COP31 and **Ethiopia** COP32.

Aravalli Hills Controversy



- The Supreme Court approved a **new height-based definition** of the Aravalli Hills, defining them as landforms ≥ 100 m above local relief.
- This effectively narrows their legal recognition and this replaces the **Forest Survey of India's (FSI)** 3-degree slope method, which recognised low-height but ecologically continuous hill systems.
- The Aravallis, one of the **world's oldest mountain ranges** (~3.2 billion years), stretch ~650–700 km from **Delhi to Gujarat** and are vital for preventing desertification, recharging groundwater, moderating climate, and supporting biodiversity.
- Environmentalists** warn the new definition could exclude many low-elevation tracts, especially in Delhi-NCR and Rajasthan, opening them to construction and urbanisation despite mining restrictions, sparking the **"Save Aravalli"** campaign.

CONSERVATION INITIATIVES, PROJECTS & CERTIFICATIONS

India's First Frozen Zoo

- **Padmaja Naidu Himalayan Zoological Park in West Bengal's Darjeeling** has become India's **first zoo to preserve DNA samples** of wildlife found exclusively in snowy regions.
- This is a **Cryogenic conservation initiative**, in collaboration with the Centre for Cellular and Molecular Biology, Hyderabad.
- As India's **highest-altitude zoological park**, it preserves the DNA of Himalayan wildlife in steel tanks **filled with liquid nitrogen at temperatures plunging to -196°C**.
- It aims to ensure that if these species face extinction, their preserved genetic material can aid in research and future conservation efforts.
- There are fewer than a dozen such facilities around the world, with the **first frozen zoo being established in 1975 by Kurt Benirschke** at the Institute for Conservation Research in San Diego.

The Blue Flag Certification



- **The Rushikonda Beach wins back the Blue Flag tag** which was temporarily withdrawn after complaints of poor maintenance of amenities.
- **Denmark-based Foundation for Environment Education (FEE)** accredits the International eco-label “Blue Flag”.

- Blue Flag certification, which attests to compliance in **50 countries with 33 criteria**, strongly emphasizes **water quality, waste management, awareness programs** for sustainable tourism, and biodiversity protection measures.

Mexico's Constitutional Reform on Native Corn Protection

- Mexico adopted a constitutional amendment banning domestic cultivation of “**genetically modified**” corn.
- This ruling deemed Mexico's restrictions on GM corn a violation of the **U.S.-Mexico-Canada Agreement (USMCA)**, stating that it lacked sufficient scientific evidence and caused unfairly restricted U.S. market access.
 - ✓ US corn farmers export nearly \$5 billion worth of GM corn to Mexico annually, primarily for livestock feed.
- The phrase **Sin maíz, no hay país**—“**Without corn, there is no country**” reflects its significance **not only as a dietary staple** but also as a national symbol.
- The crop originated in Mexico nearly 9,000 years ago when **Mesoamerican farmers** domesticated **teosinte**, a wild grass.

Himalayan High-Altitude Atmospheric Centre

- India's first **climate change station** was inaugurated in **Nathatop**, Udhampur district, Jammu and Kashmir, by the Central University of Jammu.
- The **Himalayan High Altitude Atmospheric and Climate Research Center** aims to study atmospheric and climate phenomena in the region.
- The site, chosen for its clean air and minimal pollution, is a **collaboration** between the Ministry of Science & Technology, the Jammu and Kashmir government, the Central University of Jammu, and the Swiss National Science Foundation.

- The center's first measurements, part of the **ICE-CRUNCH project**, will focus on ice-nucleating particles and cloud condensation nuclei to study their impact on cloud microphysics and climate systems in the Himalayas.
- **ICE-CRUNCH**
- It stands for "Ice nucleating particles and cloud condensation nuclei properties in the North-Western Himalayas".
- It is a **Indo-Swiss Joint Research Project** aimed at exploring the properties of ice nucleating particles and cloud condensation nuclei in the region.

Blue Talks

- The **Ministry of Earth Sciences (MoES)** in collaboration with the **Embassies of France and Costa Rica** in India, hosted the Second Blue Talks recently at **Prithvi Bhawan, New Delhi**.
- This event aimed to serve as a milestone in the lead-up to **the 3rd United Nations Ocean Conference (UNOC3)**, which will be held in Nice, France in June 2025.
- Blue Talks is a **multilateral consultation platform** that brings together governments, scientists, and civil society **to build consensus for sustainable ocean use**.
- The **first Blue Talks** were held in India in February, 2024.

United Nations Ocean Conference (UNOC):

- UNOC is an important UN conference that specifically focuses on the implementation of **Sustainable Development Goal 14: Life Below Water**.
- It held its **first conference in New York in 2017** (UNOC1) and its second in 2022 in Lisbon (UNOC2).
- UNOC3 (2025) will be held in Nice and will focus on "Accelerating action and mobilising all actors to conserve and sustainably use the ocean".

Operation Olivia

- **The Indian Coast Guard (ICG)**, under its Operation Olivia in Odisha, has successfully protected over six lakh Olive Ridley turtles this February.
- Operation Olivia initiated in the early 1980s is an **annual mission conducted from November to May**.
- It is aimed at ensuring safe nesting grounds for Olive Ridley turtles, particularly at **Gahirmatha Beach**.

The Olive Ridley (*Lepidochelys olivacea*):

- ★ It is listed as **vulnerable** under the **International Union for Conservation of Nature's Red list**.
- ★ There are **seven species** of Marine Turtles in the world and 5 are found in India.
- ★ All **five species** of sea turtles found in India are included in **Schedule I of the Indian Wildlife Protection Act, 1972**, and in the Appendix I of the Convention of International Trade in Endangered Species of Wild Fauna and Flora (CITES), which prohibits trade in turtle products by signatory countries.



India's First Hornbill Conservation Centre

- The Tamil Nadu government has announced the establishment of **India's first Centre of Excellence for Hornbill Conservation** at the **Anamalai Tiger Reserve (ATR)** in Coimbatore district.
- The centre will focus on **four hornbill species** found in the Western Ghats:
 - 👉 Great Hornbill (VU)
 - 👉 Malabar Grey Hornbill (LC)

🦅 Malabar Pied Hornbill (NT)

🦅 Indian Grey Hornbill (LC)

- In addition to ATR, It will extend to **Kalakkad Mundanthurai Tiger Reserve (KMTR), Sathyamangalam Tiger Reserve (STR), and parts of Kanyakumari district.**
- The Great Hornbill (*Buceros bicornis*) is the state bird of Arunachal Pradesh and Kerala.
- Hornbills are considered **keystone species** because their role as “forest farmers” and efficient seed dispersers is crucial for the regeneration and biodiversity of forest ecosystems.

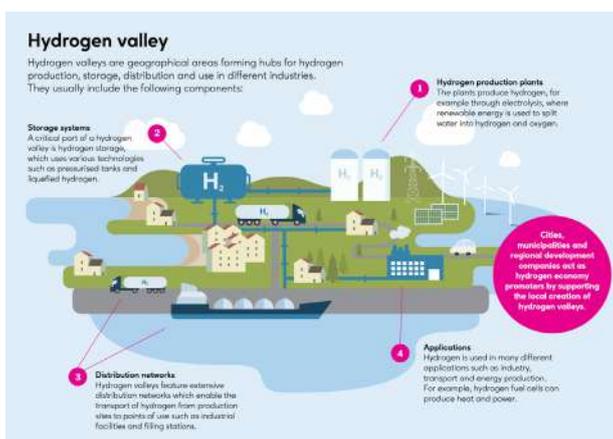
Indigenous Pollution Control Vessel Launched for Indian Coast Guard

- **Samudra Prachet**, the second and final **indigenous Pollution Control Vessels (PCVs) built by Goa Shipyard Ltd. (GSL)** for the Indian Coast Guard (ICG) was launched in Vasco, Goa recently.

➡ The 1st PCV was **Samudra Paheredar**.

- The Ministry of Defence said that with **72% indigenous components**, the project boosts national capability, jobs, and skills through local industry and MSME involvement.
- The ship is equipped with **two side-sweeping arms capable of collecting oil spills**, as well as a modern radar system for detecting oil slicks.
- The vessel is engineered to recover oil across the **full viscosity spectrum**, pump in contaminated water, analyse and separate pollutants, and store recovered oil in dedicated onboard tanks

Green Hydrogen Valley Declaration



- **Andhra Pradesh** has unveiled the **Amaravati Green Hydrogen Valley Declaration.**
- A **Hydrogen Valley** is a geographically defined region where hydrogen is produced, stored, distributed, and used across multiple sectors such as industry, transport, power generation, and residential heating.
- It aims to create a **self-sustaining hydrogen ecosystem** by demonstrating the entire hydrogen value chain within one area—from renewable-based hydrogen production (typically green hydrogen via electrolysis) to various end uses.
- A **Green Hydrogen Valley** is a type of Hydrogen Valley that specifically focuses on the **production and use of green hydrogen**, which is generated using **renewable energy sources** like solar or wind power through a process called **electrolysis** (splitting water into hydrogen and oxygen).

India Launches First Weather Derivatives

- The National Commodity and Derivatives Exchange Ltd (**NCDEX**) has partnered with the India Meteorological Department (**IMD**) to launch **India's first weather derivatives.**
- A **weather derivative** is a financial contract that provides compensation based on specific weather conditions like rainfall, temperature, or snowfall.
- **Weather derivatives** are usually issued by **exchanges** (like NCDEX), **insurance companies**, or **financial institutions.**
- They are bought by **farmers, agribusinesses, energy companies, tourism operators**, and other weather-sensitive industries to protect against weather-related income loss.
- It gives money if certain weather conditions happen, like too little rain or very high temperatures.
- 🦅 **For example**, if a farmer buys a contract that pays if rainfall is below 40 mm in July, and it rains only 30 mm, the farmer gets paid — even if crops are not damaged.
- **NCDEX** is India's largest agricultural derivatives exchange, established in 2003.
- It operates under SEBI regulation and focuses on transforming India's agri sector through an online, multi-commodity trading platform

Rhisotope Project

- Recently, a South African University, in collaboration with the **International Atomic Energy Agency (IAEA)** has launched an innovative **rhino anti-poaching initiative** using **radioactive isotopes** (radioisotopes).
- It involves a **non-invasive procedure** where **measured low doses of radioisotopes** are injected into **the horns of live rhinoceroses**.
- This makes the **horn useless and toxic for human consumption**, while the procedure is safe for rhinoceroses.
- The radioactively treated rhino horns are identifiable by **Radiation Portal Monitors (RPMs) and scanners at borders, ports, and airports**, even inside fully loaded containers which makes the horns dangerous to smugglers and less marketable in illegal trade.
- The project began with five rhinos treated in the **Waterberg Biosphere Reserve** and aims to scale up for mass treatment to protect South Africa's declining rhino population.

Blue Flag Certification

- Five beaches in Maharashtra—**Shrivardhan and Nagaon (Raigad), Parnaka (Palghar), and Guhagar and Ladghar (Ratnagiri)**—have earned the international **Blue Flag** certification.

- Blue Flag certification is awarded by **Denmark's Foundation for Environmental Education (FEE)** for meeting 33 criteria on cleanliness, safety, environmental management, water quality, and amenities.
- **As of October 2025, India has 17 Blue Flag beaches**, including Shivrajpur (Gujarat), Radhanagar (Andaman), Kovalam (Tamil Nadu), and others across Karnataka, Kerala, Andhra Pradesh, Odisha, Puducherry, Diu, and Lakshadweep.



EMERGING ECOLOGY & INNOVATION TOPICS

Cali Fund

- The **'Cali Fund'** was launched at the resumed COP16 of the UN Convention on Biological Diversity in Rome after the original meeting in Cali, Colombia, was cut short.
- The COP16 meeting in Cali, Colombia, last year was cut short due to a **lack of quorum**—not enough countries were present to make official decisions
- This was due to a **boycott by many countries**, mainly from the **European Union and other developed nations**.

↪ They protested over **disagreements on financial commitments**,

- It will receive contributions from industries using Digital Sequence Information (DSI) from plants, animals, and microorganisms.
- Funds will support **biodiversity projects**, developing countries, and scientific research, with at least 50% allocated to indigenous and local communities.
- Managed by **UNDP and UNEP**, it is the first UN biodiversity fund to receive **direct business contributions** and supports the Kunming-Montreal Global Biodiversity Framework goal of reversing biodiversity loss by 2030.

Intertidal Bioblitz



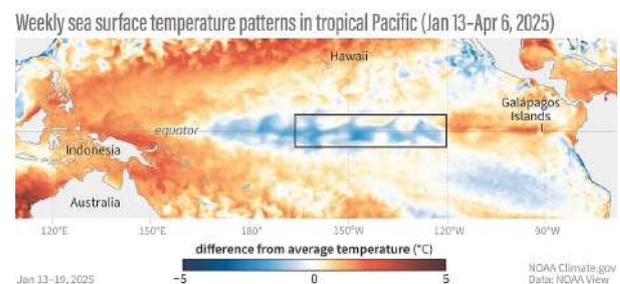
- India's **first Intertidal Bioblitz** documented over **500 marine species** along the coasts of **Visakhapatnam, Mumbai, Goa, and the Andaman Islands**.
- An **Intertidal Bioblitz** is an intensive survey of marine biodiversity in the **intertidal zone**, the area between high and low tide.
- The **10-day survey**, led by the Coastal Conservation Foundation and East Coast Conservation Team, recorded **3,600+ observations**, including **Pseudoceros bifascia**, a flatworm species recorded for the first time on mainland India.
- Team found that the **fourth global coral bleaching event** in 2024 had a severe impact on this region of the Andaman islands, mainly its soft corals.

Domoic Acid

- **An algal bloom near California's coast** has caused usually friendly **sea lions to become aggressive** and attack humans.
- These animals aren't attacking humans because they want to, instead, **a neurotoxin released by the algal bloom** is altering their neural networks and causing them to experience unbearable stress, aggression, muscle spasms and permanent brain damage.
- **Domoic acid**, which is secreted by the algae diatom **Pseudo-nitzschia**, is a known marine neurotoxin that enters the food chain and affects not just small fishes but also larger animals that feed on these fishes.
- The neurotoxin can eventually reach humans too and in high amounts, it is a lethal poison.

ENSO Neutral Condition

- The recent **La Niña event in the tropical Pacific** has officially ended, according to the United States' National Oceanic and Atmospheric Administration (NOAA).
 - However, Oceanic and atmospheric patterns **now reflect ENSO-neutral conditions** — a phase expected to **persist through the Northern Hemisphere summer**, with a **greater than 50% likelihood lasting into the autumn**.
 - **ENSO, or El Niño Southern Oscillation**, is a recurring climate pattern involving changes in the temperature of waters in the central and eastern tropical Pacific Ocean.
 - **It affects not only sea-surface temperatures (SST)** but also wind patterns, atmospheric pressure and rainfall across large parts of the globe.
- ➡ **La Niña and El Niño are the two opposing phases of ENSO.**
- ENSO-neutral, by contrast, describes a state where neither El Niño nor La Niña is dominant.
 - While neutral phases tend to make **global seasonal forecasts more uncertain**, they are often a **transitional period** between the two more extreme phases.
 - This quick shift to neutral conditions happened as warm water spread westward across the eastern Pacific and the pool of cooler water below the surface began to shrink.
 - Some signs of La Niña in the atmosphere (like strong trade winds) were still present, but **without the cold surface water**, the system no longer qualified as La Niña.



Marine Fisheries Census

- The 5th National Marine Fisheries Census (MFC25) will be conducted from November to December, covering **1.2 million fishermen households across India's coastal states**.
- The census, **last conducted in 2016**, will document the socio-economic conditions of marine fishermen and map fisheries infrastructure.
- **Local enumerators** will reach every fisherman household for this **45-day survey**, coordinated under the **Pradhan Mantri Matsya Sampada Yojana (PMMSY)** by the Ministry of Fisheries.
- The **ICAR-Central Marine Fisheries Research Institute** will lead the census on the mainland, while the **Fishery Survey of India** will handle data collection in Union Territories.
- For the first time, data collection will be digital and real-time, using the **'VyAS-NAV' app** developed by ICAR-CMFRI.

Baku to Belém Roadmap

- During the recently held 11th BRICS Environment Ministers' meeting in Brazil, India called upon BRICS nations **to mobilise \$1.3 trillion for climate financing**.
- The goal of the **'Baku to Belém Roadmap to 1.3T'** is to scale up climate finance for developing countries, aiming to mobilise at least \$1.3 trillion per year by 2035.
- The 'Baku to Belem Roadmap' is a **finance mobilisation framework initiated between COP29 (Baku, Azerbaijan) and COP30 (Belem, Brazil)** to the United Nations Framework Convention on Climate Change (UNFCCC).
- The group, which earlier comprised Brazil, Russia, India, China, and South Africa, now has 11 countries as its members, collectively negotiating for climate governance at multilateral forums, including the UN climate conference.

New Genome-Edited Rice Varieties

- The **Union Agriculture Minister** recently released two genome-edited varieties of rice, the first achievement of its kind in the country.
- These two **climate-resilient** varieties have been developed by the **Indian Council of Agricultural Research (ICAR)** using cutting-edge genome editing technology.
- These have been named **'Kamala' and 'Pusa DST Rice 1'**.
- They have better **stress tolerance, improved yields**, and climate adaptability without any compromises with their existing strengths.
- **DRR DHAN 100 (KAMALA)** has been developed using genome editing technology targeting the **Cytokinin Oxidase 2 (CKX2) gene** (also known as Gn1a), to increase grain numbers per panicle.
- The resulting mutant line demonstrated superior yield performance, drought tolerance, high nitrogen-use efficiency, and **maturity ~20 days earlier (around 130 days)** than its parent variety, **Samba Mahsuri (BPT 5204)**.
- **PUSA DST RICE 1:** This new genome-edited variety has been developed over the widely cultivated fine-grain variety called MTU1010.
- Developed through **Site Directed Nuclease 1 (SDN1)** genome-editing, it targets the Drought and Salt Tolerance (DST) gene to improve the plant's resilience to harsh soil and climate conditions.
 - 👉 The new variety is relevant for farmers of saline and alkaline soils, where traditional varieties underperform.

EnviStats India 2025

- The **Ministry of Statistics and Programme Implementation** released the 8th edition of "EnviStats India 2025", which provides **comprehensive environment statistics** for India.
- It acts as a **key resource** for policymakers, researchers, and stakeholders, offering insights into the country's **environmental conditions, trends, and challenges**.

- EnviStats India is based on the **UN’s Framework for the Development of Environment Statistics (FDES), 2013**.
- FDES is a structured system developed by the UN to help countries systematically collect and analyze environmental data across **five key areas**: environmental conditions, economic interactions, residuals, disasters, and health impacts.
- **Key findings** show a rise in India’s **mean annual temperature** from 25.05°C in 2001 to 25.74°C in 2024, with both minimum and maximum temperatures increasing.
- **Rainfall** patterns showed **year-to-year variation** but no clear long-term trend.
- Inland **fish production** more than doubled from 61.36 to 139.07 lakh tonnes (2013–2024), while marine output rose modestly.
- **Corporate spending** on environmental protection was highest in the Environmental Sustainability sector (₹2,433 crore in 2021–22), followed by Natural Resource Conservation, and lowest in Agro-Forestry.

Ramsar 15th CoP

- The 15th Conference of Parties **of the Ramsar Convention** was held at **Victoria Falls, Zimbabwe**.
- The Ramsar Convention is an **international treaty for the conservation and wise use of wetlands**, named after the **Iranian city of Ramsar, on the Caspian Sea**, where the treaty was signed on February 2, 1971.
 - 🇮🇳 India ratified the convention on February 1, 1982.
- The COP15 adopted the **5th Strategic Plan for 2025-2034**, which includes four main goals and 18 targets
- India’s Resolution on **‘Promoting Sustainable Lifestyles for the Wise Use of Wetlands’** was also adopted at the session.
- The resolution is based on India’s **Mission LiFE (Lifestyle for Environment)**, promoting a “pro-planet” lifestyle that minimizes environmental impact through conscious individual and community choices and a **“Whole-of-Society” Approach** that emphasizes moving beyond government-led conservation to include individuals, local communities, and the private sector.

Equator Prize 2025

- Recently, Bibi Fatima Women’s Self-Help Group from a village in Kundgol taluk of Dharwad district, Karnataka has bagged the ‘Equator Prize 2025’ given by the **United Nations Development Programme (UNDP)**.
- The Equator Prize, started in 2002, is an international award recognizing outstanding **efforts by Indigenous peoples and local communities in reducing poverty** through the conservation and sustainable use of biodiversity.
- It is a biennial award administered by the **Equator Initiative**, a partnership hosted by the **United Nations Development Programme (UNDP)**.
- The Award is also referred to as the **Nobel Prize for Biodiversity Conservation** and the award includes a **cash prize of \$10,000** (approximately ₹8.5 lakh).
- And this year, the award selection was based on the theme **“Women and Youth Leadership for Nature-Based Climate Action”**.
- **Selection Criteria:** Winners are chosen by an independent committee based on impact (environmental, social, economic benefits across SDGs), innovation (new approaches to sustainability), scalability/replicability, resilience and adaptability, reduction of inequalities, social inclusion, and gender equality.
- **Eligibility:** Initiatives must be at least 3 years old, community- or Indigenous-led, rural-based, and nature-based with benefits for two or more SDGs.
- **Eligible Initiatives:** Community associations, cooperatives, women’s and youth groups, Indigenous or minority organizations, and NGOs.
- **Eligible Countries:** Community groups must be from UNDP-supported countries, while Indigenous Peoples can apply from anywhere, including the Global North (e.g., US, EU, Canada, Japan, Australia).
- Several **Indian organizations** like the Deccan Development Society and Kudumbashree Mission are among its notable winners

National Designated Authority for Carbon Trading (NDA)

- The **Ministry of Environment, Forest and Climate Change (MoEFCC)** has set up a National Designated Authority (NDA) to implement a **carbon emissions trading system** under **Article 6 of the Paris Agreement (2015)**.
- It is a key step in India's climate strategy to meet its **Nationally Determined Contributions (NDCs)**.

- It is a **21-member committee headed by the Secretary of the Environment Ministry** which oversees and authorizes carbon credit projects.
- It will **recommend projects eligible for carbon credit trading** under **Article 6.4** of Paris agreement and approve these projects for participation in the carbon market and **authorize the emission reduction units (ERUs)** generated.
- And this committee will ensure that the projects align with India's Sustainable Development Goals (SDGs), focusing on initiatives like green hydrogen, carbon capture, and afforestation.

OTHER ECOLOGY & ENVIRONMENT TOPICS (SOIL, FORESTS, MINERALS, ETC.)

Chhattisgarh Green GDP

- **Chhattisgarh** has become the first state to link forest ecosystems with Green GDP.
- **Green Gross Domestic Product (Green GDP)** is a concept that subtracts environmental costs, like pollution and deforestation, from traditional GDP.
- The state introduced an innovative plan that connects the ecosystem services of its forests with the Green GDP.
 - ★ Chhattisgarh has **44% of its land covered by forests**.
- The new approach assesses the **benefits that forests provide**, such as regulating the climate, enriching soil quality, purifying water, absorbing carbon dioxide among others.
- To accurately estimate the economic value of forests, the scientists will assess the essential ecosystem services they provide. This includes:
 - **Clean Air:** Amount of CO₂ absorbed by trees and converted into Oxygen will be quantified and its market value will be added to Green GDP.
 - **Water Conservation:** The water provided by forest through rivers, springs will be calculated for its economic impact.
 - **Biodiversity:** The contribution of forest fauna (animals, birds, insects) to maintain ecological balance and aiding farming.

Chinar Aadhaar



- The J&K government launched the **“Tree Aadhaar” mission** to conserve chinar trees by tracking each tree's status.
- As part of the Mission, Chinar trees **across Kashmir and the Chenab region** have been mapped and assigned a unique Tree Aadhaar ID.
- **Chinar (Platanus orientalis var. cashmeriana)** is a Maple-like tree with a wide canopy, thriving in cool, water-rich areas.
- **Takes 30-50 years to mature** and up to 150 years to reach full size.
- In autumn its deep **green leaves may change to blood red, amber, and yellow**.
- Mughals expanded chinar plantations, considering it a **royal tree**.
- Jahangir established **Naseem Bagh**, a famous chinar garden in Srinagar.

- The **native distribution** spreads from Italy to the Balkans and Iran and to some pockets of the North Himalayas.

Redefining Aravalli Hills



- Recently the **Haryana government has redefined the definition** of the Aravali hills and ranges in 2025.
- The new definition says that it **now requires hills to be over 100 metres in height above surrounding land** and they must also be composed of rocks at least a billion years old.
- Also it **restricts the Aravalis to rocks of the Aravali and Delhi supergroups** (Paleoproterozoic and Mesoproterozoic), excluding younger Neoproterozoic intrusives like Erinpura granite and Malani rhyolite.
- Critics warn** this could leave parts in Gurgaon and Faridabad unprotected, impacting existing legal safeguards like the 1992 Aravalli Notification.
- The Aravalis, one of the world's oldest ranges, stretch ~670 km across **Delhi, Rajasthan, Haryana, and Gujarat**, consisting mainly of quartzites, schists, phyllites, dolomites, and marbles, plays a key role in controlling the expansion of the Thar desert.
- Its highest peak is **Guru Shikhar at 1,722 metres** in the Arbuda Mountains of Rajasthan.

District Mineral Foundation (DMF) Guidelines

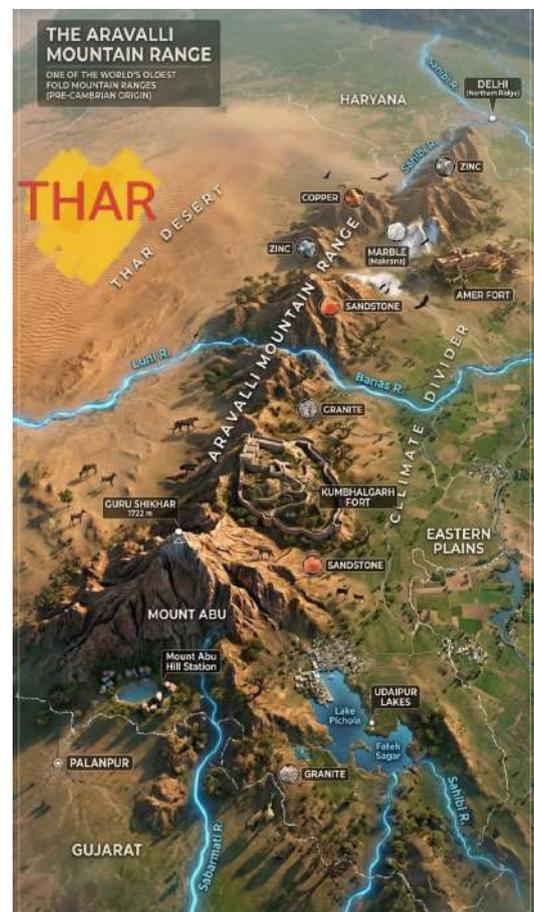
- The **Union Ministry of Coal and Mines** launched new operational guidelines for the Aspirational District Mineral Foundation (DMF) Programme.

- It has been launched to align the District Mineral Foundation (DMF) initiatives with the Aspirational District Programme (ADP) and Aspirational Block Programmes (ABP).

District Mineral Foundation (DMF):

- DMF is a non-profit trust established under the **Mines and Minerals (Development and Regulation) Amendment Act, 2015**.
- Its objective is to **work for the interest and benefit of persons**, and areas affected by mining related operations in such manner as may be prescribed by the State Government.
- State Governments** are empowered to make rules prescribing the composition and functions of the District Mineral Foundation.
- It is funded through contributions made by **holders of mining leases** for major and minor minerals, with the exact amount prescribed by central or state government rules.
- Using these funds, DMF will implement **Pradhan Mantri Khanij Kshetra Kalyan Yojana PMKKKY** (Welfare Scheme for Mining Affected Areas).

Aravalli Hills Controversy



- The Supreme Court approved a **new height-based definition** of the Aravalli Hills, defining them as landforms ≥ 100 m above local relief.
- This effectively narrows their legal recognition and this replaces the **Forest Survey of India's (FSI) 3-degree slope method**, which recognised low-height but ecologically continuous hill systems.
- The Aravallis, one of the **world's oldest mountain ranges** (~3.2 billion years), stretch ~650–700 km from **Delhi to Gujarat** and are vital for preventing desertification, recharging groundwater, moderating climate, and supporting biodiversity.
- **Environmentalists** warn the new definition could exclude many low-elevation tracts, especially in Delhi-NCR and Rajasthan, opening them to construction and urbanisation despite mining restrictions, sparking the “**Save Aravalli**” campaign.

Commission for Air Quality Management (CAQM)

- The **Commission for Air Quality Management (CAQM)** has issued show-cause notices to six thermal power plants within 300 km of Delhi for violating **biomass co-firing norms** to curb NCR air pollution.
- CAQM was established **under the Commission for Air Quality Management in NCR and Adjoining Areas Act in 2021** by replacing the Environment Pollution (Prevention and Control) Authority (EPCA).
- It coordinates air quality management across **Delhi and adjoining states (Punjab, Haryana, Rajasthan, Uttar Pradesh)**.
- CAQM, led by a Chairperson and technical experts, **plans and implements pollution control measures, frames pollutant identification frameworks, and undertakes research and capacity building** in collaboration with technical institutions.

Hard Corals (Stony Corals)

- A **Global Coral Reef Monitoring Network (GCRMN)** assessment shows **Caribbean hard coral cover has dropped 48% between 1980 and 2024** due to extreme heat and bleaching.
- Hard corals, like **elkhorn and staghorn corals**, are stony corals that build reef structures, support one-third of marine biodiversity, and host **zooxanthellae algae** for nutrition.
- They thrive in **warm, clear, shallow waters**, providing fish nurseries, coastal protection, and high biodiversity.
- Major threats include **mass bleaching events** (1998, 2005, 2023–24) and **Stony Coral Tissue Loss Disease (SCTLD)**.
- India has **both hard and soft corals**.
 - **Hard corals (stony corals):** Found in the **Andaman & Nicobar Islands, Lakshadweep, Gulf of Mannar, and Palk Bay**, these corals build reef structures and support rich marine biodiversity. Examples include **Acropora species**.
 - **Soft corals:** Found in similar regions, especially in **Andaman & Nicobar**, they are flexible, non-reef-building corals that do not form stony structures.
- **Note: Soft Corals (Non-Reef-Building)** are flexible, plant-like corals, without stony skeletons, and do not form reefs.

