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UPSC PRELIMS

CURRENT AFFAIRS

ENVIRONMENT



Strategic Current Affairs for UPSC Prelims

What's Inside

- Environment Laws & Policies
- Flora & Fauna
- Climate Change & Pollution
- Conservation Initiatives
- Disaster Management
- Concept + Current Affairs Integration

Prepared by

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ENVIRONMENT-ECOLOGY | CURRENT AFFAIRS

JANUARY 2025 – FEBRUARY 2026 | INDEX OF TOPICS

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ENVIRONMENT & ECOLOGY

CURRENT AFFAIRS (JAN 2025 – FEB 2026)

BIODIVERSITY & PROTECTED AREAS

MADHAV NATIONAL PARK – INDIA'S 58TH TIGER RESERVE

Madhav National Park in Shivpuri district (Madhya Pradesh) has been officially designated as India's 58th Tiger Reserve by the National Tiger Conservation Authority (NTCA).

News in Brief

- Located in the Upper Vindhyan Hills on the northern edge of the Central Indian Highlands.
- Total area: 1,651 sq km (core 375 sq km + buffer 1,276 sq km).
- Historic hunting reserve of Scindia rulers of Gwalior; part of the Madhav Rao Scindia legacy.
- Contains the Sakhya Sagar lake (a designated Ramsar site since 2022) and the Madhav Sagar lake.
- Declaration aligns with Project Tiger's Tigers Outside Tiger Reserves (TOTR) framework.
- Madhya Pradesh retains the 'Tiger State of India' tag with 9 tiger reserves – the highest in the country.

Prelims Connect

MADHYA PRADESH – ALL 9 TIGER RESERVES (THE "TIGER STATE")

#	Tiger Reserve	District/Region
1	Kanha	Mandla & Balaghat
2	Bandhavgarh	Umaria
3	Pench (MP portion)	Seoni & Chhindwara
4	Satpura	Hoshangabad
5	Panna	Panna & Chhatarpur
6	Sanjay–Dubri	Sidhi
7	Veerangana Durgavati	Damoh/Sagar/Narsinghpur (notified 2023)
8	Ratapani	Raisen/Sehore (notified 2024)
9	Madhav	Shivpuri (notified 2025 – 58th TR of India)

Madhya Pradesh leads the country with 9 tiger reserves, followed by Maharashtra (6) and Karnataka (5).

Prelims Pointers

- **Madhav NP:** 58th Tiger Reserve of India, in Shivpuri, MP.
- **Project Tiger (1973):** currently covers 58 TRs across 18 states.
- **Sakhya Sagar:** Ramsar wetland inside Madhav NP.
- **TOTR Project:** Tigers Outside Tiger Reserves – MoEFCC initiative in 17 states.
- **Historic significance:** Former hunting ground of the Scindias of Gwalior.

SIMILIPAL – NOTIFIED AS TIGER RESERVE (MELANISTIC TIGER HOME)

The Odisha government has officially notified the Similipal Tiger Reserve, the world's only home to wild melanistic (pseudo-melanistic) tigers, under the Wildlife (Protection) Act, 1972.

News in Brief

- Located in the Mayurbhanj district of Odisha, within the Chota Nagpur Plateau biogeographic zone.
- Part of the Similipal–Hadgarh–Kuldiha Elephant Reserve.
- UNESCO-recognised Biosphere Reserve since 2009 (added to the World Network of Biosphere Reserves).
- Hosts the world's only population of wild pseudo-melanistic tigers – a rare recessive-gene-driven dark-striped morph.
- Home to tribal communities including the Kharia and Mankirdia – Particularly Vulnerable Tribal Groups (PVTGs).
- Contains India's highest concentration of sal forests and is the watershed for the Budhabalanga, Baitarani and Subarnarekha rivers.

Prelims Connect

ODISHA – KEY PROTECTED AREAS AT A GLANCE

PA Category	Name & Claim to Fame
Tiger Reserve	Similipal (melanistic tigers); Satkosia (merger with gharial sanctuary)
National Park	Similipal NP; Bhitarkanika NP (mangroves, saltwater crocodiles)
Biosphere Reserve	Similipal (2009)
Ramsar Sites	Chilika Lake (first Indian Ramsar, 1981); Bhitarkanika Mangroves; Ansupa Lake; Tampara Lake; Hiraikud Reservoir; Satkosia Gorge
Important Bird Area	Rushikulya river mouth (Olive Ridley mass nesting)

Odisha has 6 Ramsar sites (as of early 2026) and one biosphere reserve. Similipal's melanistic tigers have been linked to a mutation in the Taqpep gene.

Prelims Pointers

- **Similipal TR:** only home of wild melanistic (pseudo-melanistic) tigers globally.
- **Biogeographic zone:** Chota Nagpur Plateau / Deccan Peninsula.
- **Tribal groups:** Kharia, Mankirdia – both PVTGs.
- **Biosphere Reserve status:** UNESCO MAB list since 2009.
- **Taqpep gene:** responsible for pseudo-melanism in Similipal tigers.

SUNDARBANS – INDIA'S SECOND-LARGEST TIGER RESERVE

The Sundarbans Tiger Reserve (STR) has officially become India's second-largest tiger reserve, covering 3,629.57 sq km after the inclusion of additional buffer areas.

News in Brief

- Earlier, Nagarjunasagar Srisailem Tiger Reserve (Andhra Pradesh) was India's largest at 3,727 sq km; Sundarbans is now second-largest.

- Located in the Ganga–Brahmaputra–Meghna delta on the Bay of Bengal coast (West Bengal).
- UNESCO World Heritage Site (1987) + Biosphere Reserve (1989) + Ramsar Site (2019).
- World's largest contiguous mangrove forest shared between India and Bangladesh.
- Home to the famed swimming Royal Bengal Tigers adapted to saline, muddy, amphibious terrain.
- Other fauna: estuarine crocodile, Gangetic dolphin, olive ridley turtle, spotted deer, rhesus macaque, horseshoe crab.

Prelims Connect

INDIA'S TOP 5 LARGEST TIGER RESERVES (BY AREA)

Rank	Tiger Reserve	State	Area (sq km)
1	Nagarjunasagar Srisailem	Andhra Pradesh	3,727
2	Sundarbans	West Bengal	3,629.57
3	Manas	Assam	2,837
4	Melghat	Maharashtra	2,768
5	Namdapha	Arunachal Pradesh	2,052

Sundarbans is also India's smallest tiger reserve by core area (~1,700 sq km core) but the second-largest by total (core + buffer).

Prelims Pointers

- **Sundarbans TR:** 2nd largest TR in India by total area (3,629.57 sq km).
- **Largest TR:** Nagarjunasagar Srisailem (Andhra Pradesh).
- **Triple tag:** UNESCO WHS + Biosphere Reserve + Ramsar Site.
- **Shared:** transboundary with Bangladesh's Sundarbans Reserved Forest.
- **Unique:** world's only mangrove tiger habitat.

KAZIRANGA — THIRD-HIGHEST TIGER DENSITY IN INDIA

Kaziranga Tiger Reserve in Assam has achieved the third-highest tiger density in India, with 18.65 tigers per 100 sq km, as per the latest NTCA phase-IV monitoring data.

News in Brief

- Kaziranga is located in the Golaghat, Nagaon, Sonitpur and Karbi Anglong districts of Assam, along the Brahmaputra floodplain.
- UNESCO World Heritage Site (1985) and a Ramsar Site (not yet notified but in proposal list).
- Famous as the single-largest stronghold of the Indian one-horned rhinoceros (~70% of the world's population).
- Hosts the 'Big Five' of Kaziranga: Rhinoceros, Asian Elephant, Royal Bengal Tiger, Wild Water Buffalo, Eastern Swamp Deer.
- Notified as a Tiger Reserve in 2006.
- Field Director Dr. Sonali Ghosh won the WCPA-Kenton Miller Award 2025 for innovation in protected area management.

Prelims Connect

HIGHEST TIGER-DENSITY RESERVES IN INDIA (per 100 sq km)

Rank	Tiger Reserve	Density
1	Corbett (Uttarakhand)	~20+
2	Kaziranga (Assam)	18.65
3	Bandipur (Karnataka)	~15
—	India average	~3.2

Kaziranga's core tiger density matches some of the best sites globally, driven by high ungulate biomass (hog deer, swamp deer, wild buffalo).

Prelims Pointers

- **Kaziranga density:** 18.65 tigers/100 sq km – 3rd highest in India.
- **Rhino stronghold:** ~70% of the world's one-horned rhino population.
- **Declared TR:** 2006.
- **Dr. Sonali Ghosh:** Field Director, won WCPA-Kenton Miller Award 2025.
- **Big Five:** Rhino, Elephant, Tiger, Wild Buffalo, Swamp Deer.

ALL INDIA TIGER ESTIMATION 2026 – THE 6TH CYCLE

The All India Tiger Estimation (AITE) 2026 has begun – India's massive, world-leading wildlife census. It is the 6th such cycle and uses the M-STrIPES (Monitoring System for Tigers: Intensive Protection and Ecological Status) mobile application for real-time data logging.

News in Brief

- Coordinated by the National Tiger Conservation Authority (NTCA) and the Wildlife Institute of India (WII).
- First conducted in 2006; subsequently carried out every four years (2010, 2014, 2018, 2022, 2026).
- Uses a three-phase double-sampling method combining sign-surveys, camera-trap captures and habitat covariates.
- Covers all 58 Tiger Reserves across 18 tiger-range states in India.
- 2022 estimation: 3,682 tigers – India hosts nearly 75% of the global wild tiger population.
- M-STrIPES app: developed indigenously; enables real-time patrol tracking, photo uploads and GPS logging.

Prelims Connect

ALL INDIA TIGER ESTIMATION – DECADEAL TRACKER

Year	Tiger Population	Remarks
2006	1,411	First modern estimation
2010	1,706	Positive recovery trend
2014	2,226	
2018	2,967	Crossed 50% of global population
2022	3,682	India = ~75% of global wild tigers
2026	Underway	6th cycle – M-STrIPES app

India's tiger conservation uses the largest camera-trapping exercise in the world, entered into the Guinness Book of World Records in 2018.

Prelims Pointers

- **AITE 2026:** 6th cycle, begins April 2026.
- **M-STrIPES:** Monitoring System for Tigers – real-time field data app.
- **2022 estimate:** 3,682 tigers (latest available).
- **NTCA + WII:** joint nodal agencies for AITE.
- **India's share:** ~75% of global wild tiger population.

GUJARAT DECLARED AN OFFICIAL 'TIGER-BEARING' STATE

The National Tiger Conservation Authority (NTCA) officially declared Gujarat a 'tiger-bearing' state after the confirmed presence of a breeding tigress and cubs in the Dang district bordering Maharashtra.

News in Brief

- Gujarat becomes the 19th tiger-range state of India.
- Presence confirmed in the Dang district forests, part of the Western Ghats biodiversity landscape.
- Gujarat already hosts the only wild Asiatic lions on the planet (Gir National Park) – now joined by tigers.
- The state now has the unique distinction of hosting both *Panthera leo persica* (Asiatic lion) and *Panthera tigris tigris* (Royal Bengal tiger).
- NTCA is expected to consider new Tiger Reserve proposals from Gujarat (e.g., Purna–Vansda landscape).

Prelims Connect

TIGER-RANGE STATES OF INDIA (as of 2026 – 19 states)

Zone	States (tiger reserves present/tigers confirmed)
Shivalik / Terai	Uttarakhand, Uttar Pradesh, Bihar
Central India	Madhya Pradesh, Maharashtra, Chhattisgarh, Jharkhand, Odisha, Telangana
Western Ghats	Karnataka, Kerala, Tamil Nadu, Goa (incl. Mhadei), GUJARAT (NEW)
North-East	Assam, Arunachal Pradesh, Mizoram, Nagaland (dispersal)
Sundarbans	West Bengal

Gujarat previously had a transient tiger in 2019 (Mahisagar sighting). The 2025–26 confirmation of a breeding female brings formal recognition.

Prelims Pointers

- **Gujarat:** 19th official tiger-range state of India.
- **Landscape:** Dang district (Western Ghats).
- **Unique:** only state to host both wild Asiatic lion AND Bengal tiger.
- **Panthera tigris tigris:** subspecies scientific name.
- **Possible new TR:** Purna–Vansda landscape under evaluation.

SILISERH LAKE – INDIA'S 96TH RAMSAR SITE

Siliserh Lake in Rajasthan's Alwar district has been declared India's 96th Ramsar Wetland, taking India's total Ramsar tally even higher and retaining the lead in Asia for Ramsar sites.

News in Brief

- Located at the foothills of the Aravallis, approximately 13 km from Alwar town.
- A man-made reservoir built in 1845 by Maharaja Vinay Singh of Alwar for water supply.
- Receives water from the Ruparel and Bhagani rivers.
- Supports migratory and resident waterbirds including bar-headed goose, common pochard, and lesser whistling duck.
- Key habitat for critically endangered species like the red-headed vulture.
- Adjoining areas form the buffer of Sariska Tiger Reserve.

Prelims Connect

RAJASTHAN'S RAMSAR SITES (as of 2026)

#	Ramsar Site	District	Year
1	Keoladeo National Park	Bharatpur	1981
2	Sambhar Lake	Jaipur/Nagaur/Ajmer	1990
3	Khichan (Phalodi)	Phalodi	2025
4	Menar Wetland	Udaipur	2025
5	Siliserh Lake	Alwar	2025 (96th India)

Keoladeo NP is also a UNESCO World Heritage Site. Sambhar is India's largest inland salt lake.

Prelims Pointers

- **Siliserh Lake:** 96th Ramsar site of India (Alwar, Rajasthan).
- **Built by:** Maharaja Vinay Singh of Alwar (1845).
- **Ramsar Convention:** 1971, Iran – India joined in 1982.
- **India rank:** largest Ramsar-site network in Asia.
- **Connected:** Sariska Tiger Reserve buffer.

BIHAR'S NEW RAMSAR SITES – GOGABEEL, GOKUL JALASHAY, UDAIPUR JHEEL

India has added three wetlands from Bihar to the Ramsar list: Gogabeel Lake in Katihar district, Gokul Jalashay in Buxar, and Udaipur Jheel in West Champaran – boosting Bihar's profile in wetland conservation.

News in Brief

- Gogabeel is an ox-bow lake formed on the vestiges of the Mahananda and Kankhar rivers.
- Gogabeel is already a Community Reserve declared under the Wildlife (Protection) Act, 1972.
- Supports greylag goose, lesser whistling duck, and migratory waders from Central Asia.
- Gokul Jalashay and Udaipur Jheel support extensive aquatic vegetation and resident waterfowl.
- Bihar's Ramsar count rises significantly – important for the Central Asian Flyway.
- The additions reinforce India's lead in Ramsar sites across Asia.

Prelims Connect

INDIA'S RAMSAR TALLY – STATE-WISE SNAPSHOT (Top 5)

Rank	State	No. of Ramsar Sites
1	Tamil Nadu	18
2	Uttar Pradesh	10
3	Gujarat	6+
4	Kerala	5
5	Odisha	6

As of 2026, India's Ramsar network crosses 96 sites with Bihar, Chhattisgarh, Rajasthan, and Andhra Pradesh being the newest entrants. Tamil Nadu leads all states.

Prelims Pointers

- **Gogabeel:** ox-bow lake of Mahananda; Ramsar + Community Reserve.
- **Gokul Jalashay:** Buxar, Bihar.
- **Udaipur Jheel:** West Champaran, Bihar.
- **Ramsar Criteria 1:** contains a representative, rare wetland type.
- **Central Asian Flyway:** India is the anchor country under CAF Action Plan.

KOPRA RESERVOIR – CHHATTISGARH'S FIRST EVER RAMSAR SITE

Chhattisgarh's Kopra Reservoir, located in the Bilaspur district, has been declared its first Ramsar site, marking a historic entry for the state onto the international wetlands list.

News in Brief

- Kopra Reservoir is a man-made wetland built for irrigation and multi-purpose use along the Arpa-Shivnath river system.
- Before this, Chhattisgarh – despite being rich in wetlands – had no Ramsar-designated sites.
- Supports a rich assemblage of migratory and resident waterfowl from the Central Asian Flyway.
- Addition follows the Union Government's Amrit Dharohar scheme for wetland conservation (2023–27).
- Other Chhattisgarh wetlands in the Ramsar pipeline include Kabir Chaura and Gangrel Reservoir.
- Designation will strengthen ecological flow management for the Mahanadi basin.

Prelims Connect

RAMSAR CONVENTION – FIVE THINGS YOU SHOULD KNOW

Feature	Detail
Full Title	Convention on Wetlands of International Importance
Adopted	1971 at Ramsar, Iran; in force since 1975
India joined	1 February 1982
First Indian site	Chilika Lake (Odisha) & Keoladeo NP (1981)

Key scheme	Amrit Dharohar (launched 2023, implemented by MoEFCC)
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Chhattisgarh's entry means only a handful of Indian states/UTs still lack a Ramsar site. Goa, Meghalaya, Nagaland, and Arunachal Pradesh are among the remaining gaps.

Prelims Pointers

- **Kopra Reservoir:** Chhattisgarh's first Ramsar site.
- **District:** Bilaspur, on the Arpa–Shivnath system.
- **Amrit Dharohar Scheme:** wetland conservation scheme (2023–27).
- **Ramsar adopted:** 1971, Iran.
- **India joined:** 1 February 1982.

UDAIPUR & INDORE — INDIA'S FIRST 'WETLAND CITIES' (RAMSAR ACCREDITED)

Udaipur and Indore have become India's first two cities to receive international accreditation as 'Wetland Cities' under the Ramsar Convention's Wetland City Accreditation scheme. Udaipur is often called the 'City of Lakes'.

News in Brief

- The Wetland City Accreditation (WCA) scheme was created under Ramsar Resolution XII.10 at COP12 in 2015.
- Udaipur's recognition is tied to its five interconnected lakes — Pichola, Fateh Sagar, Rangasagar, Swaroop Sagar and Doodh Talai.
- Indore's recognition is based on the Sirpur Lake and Yashwant Sagar Ramsar sites and active civic management.
- Wetland Cities must demonstrate urban planning integration of wetland conservation, public awareness and sustainable use.
- Only about 75 cities globally carry this accreditation as of 2026.
- Third and fourth Indian cities — Bhopal and Tirupati — are next in the approval pipeline.

Prelims Connect

WETLAND CITY ACCREDITATION — HOW IT WORKS

Criterion	Requirement
C1	One or more Ramsar sites / internationally important wetlands in or near the city
C2	Active conservation and wise-use measures
C3	Integrated wetland management in urban planning
C4	Stakeholder participation (civil society, schools, NGOs)
C5	Awareness, education and communication programmes
C6	Reporting and monitoring arrangements

Valid for 6 years; must be renewed based on continued compliance. Udaipur and Indore are the first Indian cities; Tirupati and Bhopal join in subsequent rounds.

Prelims Pointers

- **Udaipur:** 'City of Lakes', Rajasthan — 1st Indian Wetland City.
- **Indore:** Madhya Pradesh — 2nd Indian Wetland City.
- **Scheme origin:** Ramsar COP12, 2015 (Resolution XII.10).
- **Indore wetlands:** Sirpur & Yashwant Sagar (both Ramsar sites).
- **Udaipur lakes:** Pichola, Fateh Sagar, Rangasagar, Swaroop Sagar, Doodh Talai.

PALK BAY DUGONG CONSERVATION RESERVE — GLOBAL RECOGNITION

India's first Dugong Conservation Reserve in Palk Bay, Tamil Nadu, has received global recognition for its community-based marine mammal conservation model.

News in Brief

- Notified in September 2022 by the Tamil Nadu government across 448 sq km of shallow coastal waters.
- Located between Adam's Bridge and the Gulf of Mannar, protecting extensive seagrass meadows — the staple food of dugongs.
- Dugong (*Dugong dugon*) is listed as 'Vulnerable' on the IUCN Red List and placed in Schedule I of the Wildlife (Protection) Act, 1972.
- India hosts approximately 200–250 dugongs, mainly in Palk Bay, Gulf of Mannar, Gulf of Kutch and Andaman & Nicobar Islands.
- It is the world's only strictly herbivorous marine mammal (a 'sea cow').
- Listed in CMS Appendix II (Convention on Migratory Species).

Prelims Connect

DUGONG vs MANATEE — QUICK CONTRAST

Feature	Dugong	Manatee
Tail shape	Fluked (like a dolphin)	Paddle-shaped
Habitat	Marine only (Indo-Pacific)	Marine + freshwater (Atlantic)
India presence	Yes (Palk Bay, Gulf of Mannar)	No
IUCN status	Vulnerable	Vulnerable

Dugongs are the only surviving species of the family Dugongidae. Steller's sea cow, its relative, went extinct in 1768.

Prelims Pointers

- **Palk Bay Dugong Reserve:** India's first dugong protected area (448 sq km).
- **Dugong status:** IUCN Vulnerable; Schedule I of WPA 1972.
- **Population in India:** ~200–250 individuals.
- **Food:** seagrass meadows (*Cymodocea*, *Halodule* species).
- **Only species in:** family Dugongidae (Sirenia order).

TSARAP CHU CONSERVATION RESERVE — HIMACHAL PRADESH

The Himachal Pradesh government notified the Tsarap Chu Conservation Reserve under the Wildlife (Protection) Act, 1972 — a high-altitude Himalayan reserve covering the catchment of the Tsarap Chu river.

News in Brief

- Located in Lahaul & Spiti district, in the rain-shadow cold desert of the Trans-Himalaya.

- The Tsarap Chu is a left-bank tributary of the Zaskar river, itself a tributary of the Indus.
- Covers approximately 1,585 sq km of high-altitude wilderness (over 4,000 m).
- Home to snow leopard, Tibetan wolf, Ladakh urial, Himalayan ibex, Tibetan gazelle, and rare Himalayan birds.
- The reserve complements the adjoining Kibber Wildlife Sanctuary and Pin Valley National Park.
- Key habitat for species on the Global Snow Leopard Ecosystem Protection Programme (GSLEP) list.

Prelims Connect

CATEGORIES OF PROTECTED AREAS UNDER WPA 1972

Category	Key Feature
National Park	Highest protection; no human rights allowed (Sec 35)
Wildlife Sanctuary	Human activities restricted; certain rights permitted (Sec 26A)
Conservation Reserve	Buffer/corridor lands owned by govt; community participation (Sec 36A)
Community Reserve	Private/community land; rights protected (Sec 36C)
Tiger Reserve	Declared by NTCA (Sec 38V); core + buffer zones

Conservation Reserves were added as a new category by the 2002 amendment to the Wildlife (Protection) Act.

Prelims Pointers

- **Tsarap Chu CR:** HP's newest Conservation Reserve (~1,585 sq km).
- **River:** Tsarap Chu – tributary of Zaskar → Indus.
- **Category:** Conservation Reserve under Sec 36A of WPA 1972.
- **Flagship species:** Snow Leopard (*Panthera uncia*).
- **GSLEP:** 12 snow-leopard range countries; India is a member.

NEW RAMSAR ADDITIONS – KHICHAN, MENAR & DHANUSHKODI FLAMINGO SANCTUARY

India has added Khichan (Phalodi) and Menar (Udaipur) wetlands in Rajasthan as new Ramsar Sites, and Tamil Nadu has declared a Greater Flamingo Sanctuary at Dhanushkodi in Ramanathapuram – significant milestones for flyway and wetland conservation.

News in Brief

- Khichan village in Phalodi is famous for the annual congregation of thousands of demoiselle cranes (locally called 'Kurjan').
- Menar is known as 'Bird Village' of Mewar with community-led protection of resident and migratory waterfowl.
- Dhanushkodi Flamingo Sanctuary is Tamil Nadu's first sanctuary explicitly for Greater Flamingos (*Phoenicopterus roseus*).
- It lies on the Gulf of Mannar–Palk Strait junction – a prime wintering ground for shorebirds and flamingos.
- Tamil Nadu now leads India with 18 Ramsar sites – the highest among states.
- Khichan is along the Indus–Central Asian Flyway; Menar anchors a network of Mewar lake systems.

Prelims Connect

INDIA'S 18 BIOSPHERE RESERVES – MASTER LIST

#	Biosphere Reserve	State/Region	UNESCO MAB
1	Nilgiri	TN/KL/KA	Yes (2000)
2	Nanda Devi	Uttarakhand	Yes (2004)
3	Nokrek	Meghalaya	Yes (2009)
4	Sundarban	West Bengal	Yes (2001)
5	Gulf of Mannar	Tamil Nadu	Yes (2001)
6	Pachmarhi	Madhya Pradesh	Yes (2009)
7	Simlipal	Odisha	Yes (2009)
8	Achanakmar–Amarkantak	CG/MP	Yes (2012)
9	Great Nicobar	A&N Islands	Yes (2013)
10	Agasthyamala	KL/TN	Yes (2016)
11	Khangchendzonga	Sikkim	Yes (2018)
12	Panna	Madhya Pradesh	Yes (2020)
13	Manas	Assam	No
14	Dihang–Dibang	Arunachal Pradesh	No
15	Dibru–Saikhowa	Assam	No
16	Kachchh	Gujarat (largest)	No
17	Cold Desert	Himachal Pradesh	No
18	Seshachalam	Andhra Pradesh	No

India has 18 Biosphere Reserves, of which 12 are on the UNESCO Man and the Biosphere (MAB) World Network. Kachchh is the largest; Panda the smallest.

Prelims Pointers

- **Khichan (Phalodi):** Ramsar; famous for demoiselle crane (Kurjan) congregation.
- **Menar Wetland:** 'Bird Village' of Mewar, Udaipur – Ramsar.
- **Dhanushkodi Sanctuary:** TN's first Greater Flamingo sanctuary.
- **Tamil Nadu:** leads India with 18 Ramsar sites.
- **Greater Flamingo:** *Phoenicopterus roseus* – IUCN Least Concern; Schedule IV, WPA.

DPS FLAMINGO LAKE – NAVI MUMBAI'S NEW WILDLIFE RESERVE

The Maharashtra State Wildlife Board has officially approved the declaration of DPS Flamingo Lake in Navi Mumbai as a wildlife protected area – a key urban wetland for migratory flamingos.

News in Brief

- Located near the Delhi Public School (DPS) in Nerul, Navi Mumbai – hence the name.
- Part of the wider Thane Creek Flamingo Sanctuary ecosystem along Mumbai's east coast.
- Serves as a seasonal habitat for over 100,000 flamingos – Greater Flamingos and Lesser Flamingos.
- A rare example of an urban wetland being brought under formal protection amid high development pressure.
- Highlights the ecological significance of tidal mudflats and halophytic vegetation in coastal megacities.
- Complements Thane Creek Flamingo Sanctuary (notified 2015) and the Sewri mudflats.

Prelims Connect

FLAMINGO FACT SHEET FOR INDIA

Species	Status / Site
Greater Flamingo	Phoenicopterus roseus – widespread; Kutch, Gulf of Mannar, Thane Creek
Lesser Flamingo	Phoeniconaias minor – IUCN Near Threatened; Kutch breeds in India
Major Indian Sites	Rann of Kutch (breeding), Pulicat, Chilika, Sambhar, Thane, Dhanushkodi

Flamingos get their pink colour from carotenoid pigments (beta-carotene) in algae and crustaceans – especially the brine shrimp Artemia.

Prelims Pointers

- **DPS Flamingo Lake:** Navi Mumbai's new urban wildlife reserve.
- **Species:** Greater Flamingo (least concern) + Lesser Flamingo (near threatened).
- **Main breeding site in India:** Rann of Kutch.
- **Colour source:** beta-carotene from Spirulina algae + Artemia.
- **Connected:** Thane Creek Flamingo Sanctuary ecosystem.

KHANGCHENDZONGA ON IUCN GREEN LIST & KERALA NO. 1 IN MEE

Khangchendzonga National Park (KNP), Sikkim received a 'Good' rating in the IUCN's 2025 World Heritage Outlook – climbing onto the IUCN Green List of well-managed protected areas. Separately, Kerala secured the top position in the Management Effectiveness Evaluation (MEE) of Indian national parks.

News in Brief

- Khangchendzonga NP (Sikkim) is a UNESCO World Heritage Site (mixed) and a Biosphere Reserve.
- The IUCN Green List of Protected and Conserved Areas certifies sites meeting global best practice for effective, equitable management.
- Only a handful of Indian sites currently feature on the IUCN Green List.
- Kerala topped the 5th cycle of MEE of tiger reserves and national parks – conducted by the Wildlife Institute of India.
- MEE evaluates protected areas on context, planning, inputs, processes, outputs and outcomes (six elements of the IUCN-WCPA framework).
- Kerala's high score reflects strong forest governance, community participation and effective monitoring.

Prelims Connect

MANAGEMENT EFFECTIVENESS EVALUATION (MEE) – KEY FACTS

Element	Question Addressed
Context	Where are we now? (threats, values)
Planning	Where do we want to be? (objectives, plan)
Inputs	What do we need? (staff, budget)
Processes	How do we go about it? (day-to-day management)
Outputs	What were the results? (activities achieved)
Outcomes	What did we achieve? (biodiversity gains)

MEE in India is a four-yearly exercise coordinated by MoEFCC & WII, adapted from the IUCN-WCPA framework.

Prelims Pointers

- **Khangchendzonga NP:** 'Good' rating in IUCN World Heritage Outlook 2025.
- **IUCN Green List:** certifies effective, equitable management.
- **MEE 2025:** Kerala ranks No. 1 in national park management.
- **MEE framework:** IUCN-WCPA, six elements.
- **Conducted by:** Wildlife Institute of India (WII), Dehradun.

KUNMING-MONTREAL GLOBAL BIODIVERSITY FRAMEWORK (KMGBF)

Prelims Connect

Adopted at	CBD COP-15 (2022) Kunming/Montreal
Goals and Targets	4 goals and 23 targets to protect biodiversity by 2030
30x30 Target	Protect 30% of global land and marine areas by 2030 (Target 12 covers urban green-blue spaces; aligns with SDG Goal 11 on sustainable cities)
OECMs	Other Effective Area-Based Conservation Measures – moves beyond protected areas. 4 criteria: (1) not a PA; (2) governed by any recognised body incl. IPLCs; (3) supports biodiversity conservation; (4) protects ecosystem and cultural values
IPLC rights	Mandates inclusion of Indigenous Peoples and Local Communities in conservation; recognises traditional knowledge and cultural practices
CBD COP-16 (2024)	Created permanent body to uphold IPLC rights under Article 8(j) – first among UN conventions. India's updated NBSAP outlines 23 targets for 2030
CBD basics	Launched at 1992 Rio Earth Summit. Three goals: conservation, sustainable use, and equitable benefit-sharing of biodiversity. 196 parties.

India's BDA 2002	Biological Diversity Act, 2002 – three-tier system: National Biodiversity Authority (NBA), State Biodiversity Boards (SBBs), Biodiversity Management Committees (BMCs)
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Prelims Pointers

- Convention on Biological Diversity – launched at 1992 Rio Earth Summit; 196 parties. CBD:
- marked turning point by linking Adivasi rights to forest governance through gram sabhas. FRA 2006:
- urges states to preserve traditional knowledge and respect IPLC practices. CBD Article 8(j):

ARAVALLI HILLS – MINING DEFINITION, GREEN WALL & SAFARI PARK

The government declared that Aravalli hills with elevation below 100 metres are not subject to mining restrictions. 90% of the Aravalli range falls below the 100-metre threshold – raising major conservation concerns.

About Aravalli Hills

Age and extent	Nearly 2 billion years old – India's oldest mountain range. Stretches 700 km from Gujarat (Champaner) through Rajasthan to Delhi and Haryana
Ecological role	Prevents desertification of Indo-Gangetic plains; arrests eastward spread of Thar Desert; supports groundwater recharge; climate stabilisation; biodiversity conservation
Rivers sourced	Chambal, Sabarmati, Luni, Banas
Minerals	Rich in sandstone, limestone, marble, granite, lead, zinc, copper, gold, tungsten
Highest peak	Guru Shikhar – Sirohi district, Rajasthan
FSI 2010 definition	Aravalli hills: slope >3°, 100 m foothill buffer, 500 m inter-hill distance
SC-appointed committee	An 'Aravalli Hill' = landform with ≥100 m elevation above local relief. An 'Aravalli Range' = cluster of two or more such hills within 500 m

Aravalli Conservation Initiatives

- PM launched on World Environment Day (June 5); 5 km buffer zone covering 6.45 million hectares; contributes to India's NDC goal of 2.5–3 billion tonnes CO₂-eq carbon sink; introduced at UNCCD COP16, Riyadh. Aravalli Green Wall Project:
- Haryana's proposed 3,858-hectare safari park in Gurugram and Nuh – envisaged as world's largest safari park. Concerned area classified as 'forest' under Forest Conservation Act, 1980. Protected by Punjab Land Preservation Act (PLPA) 1900, Sections 4 and 5. Aravalli Safari Park:

Prelims Pointers

- kept judgment in abeyance on the 100-metre definition; directed no fresh mining leases without prior court approval. SC:
- Punjab Land Preservation Act – protects Aravalli hills from deforestation for non-agricultural use. PLPA 1900:

ECO-SENSITIVE ZONES (ESZs) – REVISED APPROACH

News in Brief

- SC-NBWL decided to REVISIT 2011 guidelines on ESZ declaration around national parks and wildlife sanctuaries.
- Extending a blanket 10-km ESZ to ALL protected areas would not work – cited Sanjay Gandhi NP (Mumbai) and Asola Bhatti Sanctuary (Delhi) as examples.
- In Himachal Pradesh, 65% of area already under forest/protected status – rigid ESZ norms could hinder development.

Prelims Connect

NEP 2006 definition	'Areas with unique environmental resources requiring special attention for conservation' due to landscape, wildlife, biodiversity, historical, and scenic qualities
Purpose	Act as 'shock absorbers' for protected areas – minimise negative impact on fragile ecosystems
Activities prohibited	Commercial mining, saw mills, commercial use of wood
Activities regulated	Felling of trees
Activities permitted	Ongoing agricultural/horticultural practices, rainwater harvesting, organic farming

Prelims Pointers

- **Eco-Sensitive Zone** – declared by MoEFCC to create a buffer around protected areas. ESZ:
- **National Environment Policy** – defines ESZs as areas requiring special conservation attention. NEP 2006:

GREAT NICOBAR PROJECT – ENVIRONMENTAL CONCERNS

The ₹72,000-crore Great Nicobar Infrastructure Project (GNIP) includes a transshipment port, international airport, township development, and 450 MVA gas and solar power plant. EIA study downplays risk of future earthquakes and tsunamis from the Andaman-Sumatra fault line.

News in Brief

- 16,510 coral colonies near the project must be translocated. About 51 active nests of Nicobar megapode in project area; ~30 permanently destroyed.
- Potential felling of nearly 1 million trees. Indira Point – India's southernmost point – is 90 nautical miles from Sabang, northern Sumatra.
- Great Nicobar: two national parks (Campbell Bay, Galathea), a biosphere reserve (UNESCO MAB 2013), and is home to Shompen and Nicobarese tribes.
- Issues: FRA 2006 compliance – forest diversion allowed only after settlement of rights and Gram Sabha consent. Nicobarese Tribal Council disputes 2022 Gram Sabha consent.
- PAT56 (Protection of Aboriginal Tribes Act, 1956) vs FRA – uncertainty over which law governs diversion.

Prelims Connect – Species at Risk

- Vulnerable (IUCN); endemic only to Nicobar archipelago; uses natural heat (mounds of sand, soil, vegetation) to incubate eggs; exclusive habitat: littoral forest. Nicobar Megapode:
- largest sea turtle; no hard shell; Vulnerable globally / Critically Endangered in Indian Ocean sub-population. Galathea Bay = one of only three major nesting sites globally. Leatherback Turtles:
- *Lycodon irwini* (named after Steve Irwin) – recommended as 'Endangered' under IUCN. Very rare, sharply restricted range. New wolf snake:

Prelims Pointers

- Andaman and Nicobar Islands Integrated Development Corporation – quasi-government agency implementing GNIP. ANIIDCO:
- Island Protection Zone Notification – coastal stretches within 500 m from High Tide Line in A&N Islands regulated for developmental activities. IPZ 2011:

IUCN 'SIGNIFICANT CONCERN' SITES – INDIAN WORLD HERITAGE SITES

Prelims Connect

IUCN WORLD HERITAGE OUTLOOK 4 – INDIAN NATURAL SITES RATING

IUCN Rating	Indian Sites
Good	Khangchendzonga National Park (Sikkim)
Good with some concerns	Great Himalayan NP, Kaziranga NP, Keoladeo NP, Nanda Devi and Valley of Flowers NPs
Significant concern	Western Ghats, Manas National Park (Assam), Sundarbans National Park (West Bengal)

Western Ghats – Key Threats

- Hydropower: Sillahalla Pumped Storage Hydroelectric Project (Nilgiris) – 1,000 MW; dams on Sillahalla and Kundah Rivers.
- Climate-induced species redistribution: Nilgiri flycatcher and black-and-orange flycatcher shifting to higher altitudes.
- Invasion by exotic species like eucalyptus and acacia (introduced during colonial era).
- Western Ghats facts: 1,600 km-long chain; UNESCO WHS; covers Gujarat, Maharashtra, Goa, Tamil Nadu, Karnataka, Kerala; 325 globally threatened species; home to rare Nilgiri tahr found nowhere else in the world.

Prelims Pointers

- recommended 64% area of Western Ghats as ecologically sensitive. Gadgil Panel:
- reduced this to 37% as ecologically sensitive. Kasturirangan Panel:

COLD DESERT BIOSPHERE RESERVE – INDIA'S 13TH UNESCO BIOSPHERE RESERVE

News in Brief

- India's Cold Desert Biosphere Reserve added to UNESCO World Network of Biosphere Reserves (WNBR) – India's 13th entry.

- Located in Lahaul-Spiti district, Himachal Pradesh. Includes Baralacha Pass, Bharatpur, and Sarchu.
- Integrates: Pin Valley National Park, Kibber Wildlife Sanctuary, Chandratat Wetland, Sarchu plains.
- Features: windswept plateaus, glacial valleys, alpine lakes, high-altitude desert – one of coldest and driest ecosystems in WNR.
- Flagship species: Snow Leopard. Prey base: 800+ blue sheep (Bharal).
- Approved at 37th session of UNESCO's International Coordinating Council of the Man and the Biosphere (MAB) held in Paris.

Prelims Connect

12 PREVIOUS UNESCO BIOSPHERE RESERVES FROM INDIA

Biosphere Reserve	Year Added	States
Nilgiri (1st from India)	2000	Tamil Nadu, Kerala, Karnataka
Gulf of Mannar	2001	Tamil Nadu
Sunderban	2001	West Bengal
Nanda Devi	2004	Uttarakhand
Nokrek	2009	Meghalaya
Pachmarhi	2009	Madhya Pradesh
Similipal	2009	Odisha
Achanakmar-Amarkantak	2012	MP and Chhattisgarh
Great Nicobar	2013	Andaman & Nicobar Islands
Agasthyamala	2016	Kerala and Tamil Nadu
Khangchendzonga	2018	Sikkim
Panna	2020	Madhya Pradesh

FOREST RIGHTS ACT – FRA vs FCA, CFRR & TARANG PORTAL

FRA vs FCA Conflict

- SC noted conflict between FRA (2006) and Forest Conservation Act (FCA), 1980.
- Case: PVTG villagers in MP's Binega trying to build PM-AWAS housing on forest land where they hold forest rights titles.
- FCA Section 2: forest land cannot be used for non-forestry purposes – including agriculture – without Central government prior approval.
- FRA allows certain 'non-forestry' activities for providing services to communities, but does NOT explicitly include construction of pucca housing.

- FRA – Hasdeo Arand: Chhattisgarh HC dismissed petition challenging cancellation of Community Forest Rights in villages near Adani's Parsa East coal mines. Addressed for first time whether FRA rights can be revoked.

Oran Forests – Rajasthan's Sacred Groves

- SC recognised 'Oran' lands as forests under the FCA, 1980. Rajasthan initiated classification following SC directive.
- Orans: socio-religious forest patches managed by villages, dedicated to deities. Also known as 'malvan', 'deo ghat', 'baugh'.
- Once classified, will be notified as 'community reserves' under Wildlife Protection Act, 1972.
- India has 1-10 lakh sacred groves – highest globally.

FRA – CFRR and TARANG Portal

- Community Forest Resource Rights (CFRR): Empowers gram sabhas to manage customary forests – correcting colonial forest injustices.
- TARANG Portal (beta): National web portal for all FRA processes – from Gram Sabha FRC claims to State-Level Monitoring Committees. Issues digital title deeds; stores legacy data; FRA Atlas maps potential forest areas.

Prelims Connect

SACRED GROVE NAMES ACROSS INDIA

State/Region	Local Name	State/Region	Local Name
Karnataka	Devara kadu	Himachal Pradesh	Devban
Kerala	Kavu / Sarpa kavu	Chota Nagpur Plateau	Sarna
Chhattisgarh	Devbani / Devgudi	Odisha	Jahera
Meghalaya	Ki law lyngdoh	Rajasthan	Oran / Malvan / Deo ghat

Prelims Pointers

- **first law linking Adivasi rights to forest governance through gram sabhas.** FRA 2006:
- **Technology for Adivasi Rights And Natural resources Governance – national FRA portal (beta version).** TARANG:
- **Community Forest Resource Rights – empowers gram sabhas to manage customary forests under FRA.** CFRR:

GLOBAL FOREST RESOURCES ASSESSMENT (GFRA) – INDIA'S RANKING

News in Brief

- India climbed to 9th spot in total forest area (up from 10th in 2015) and retained 3rd rank in annual forest area gain [FAO GFRA report].
- World forest cover: 4.14 billion hectares = 32% of total land area (0.50 ha per person).
- Deforestation rate declining but still high at 10.9 million ha/year.
- Largest forest areas: Russia, Brazil, Canada, USA, China.

- India's total forest area: 72.74 million hectares = 2% of global forests. Annual gain: 191,000 hectares (0.27%) between 2015–2025.
- Growth in India's forest cover largely driven by plantation species such as bamboo and rubber.
- Maximum annual net forest loss: Brazil, Angola, and Tanzania.

Prelims Pointers

- conducted every 5 years; comprehensive evaluation of global forest resources. FAO GFRA:
- India's green cover = 25.17% (21.76% forest + 3.41% tree cover); total 8,27,357 sq km; 3,913 sq km of dense forest lost 2021–23. India's ISFR 2023:

SPECIES IN NEWS

CHEETAH – KUNO TO GANDHI SAGAR TRANSLOCATION

The Cheetah Project Steering Committee has approved the translocation of cheetahs from Kuno National Park to the Gandhi Sagar Wildlife Sanctuary in Madhya Pradesh – Project Cheetah's second home.

News in Brief

- Project Cheetah (launched 17 September 2022) reintroduced the African Cheetah (*Acinonyx jubatus jubatus*) from Namibia and South Africa after India's Asiatic Cheetah went extinct in 1952.
- Gandhi Sagar Wildlife Sanctuary is located in the Chambal Gorge region of western MP and Rajasthan.
- Cheetah is the world's fastest land mammal (up to 110 km/h).
- Cheetah is the only big cat that does not roar (it chirps and purrs) – it lacks the hyoid bone found in other Panthera species.
- IUCN status: Vulnerable (*Acinonyx jubatus*); Asiatic subspecies is Critically Endangered (only in Iran).
- Rajasthan has been added to the first interstate Cheetah conservation corridor along with MP.

Prelims Connect

PROJECT CHEETAH – MILESTONES

Date	Event
17 Sept 2022	First 8 Namibian cheetahs released in Kuno NP
Feb 2023	12 South African cheetahs added
2023–24	First cubs born on Indian soil
2025	Approval for translocation to Gandhi Sagar (2nd home)
2025	India–Rajasthan–MP Cheetah Corridor notified

Kuno NP is named after the Kuno River (tributary of Chambal). It is also a candidate reintroduction site for the Asiatic lion.

Prelims Pointers

- **Project Cheetah:** launched 17 Sept 2022 at Kuno NP, MP.
- **Second home:** Gandhi Sagar WLS, MP (2025).
- **Scientific name:** *Acinonyx jubatus*.

- **IUCN status:** Vulnerable; Appendix I of CITES.
- **India's first interstate cheetah corridor:** MP + Rajasthan.

NILGIRI TAHR CENSUS – INDIA'S FIRST CO-ORDINATED COUNT

Kerala and Tamil Nadu will jointly conduct a Nilgiri Tahr census in April, across 265 census blocks – India's first coordinated population count of the state animal of Tamil Nadu.

News in Brief

- Scientific name: Nilgiritragus hylocrius; endemic to the southern Western Ghats.
- IUCN status: Endangered; listed in Schedule I of the Wildlife (Protection) Act, 1972.
- Also called 'Varayaadu' in Tamil and 'Mountain Monarch' of the Western Ghats.
- Stronghold: Eravikulam National Park (Kerala) – India's highest population.
- State animal of Tamil Nadu.
- Habitat: montane grasslands (sholas) above 1,200 m elevation.

Prelims Connect

KEY NILGIRI TAHR POPULATIONS

Site	State	Role
Eravikulam NP	Kerala	Global stronghold; largest population
Anamalai Tiger Reserve	Tamil Nadu	Second-largest population
Mukurthi NP	Tamil Nadu	Important sub-population
Kalakkad Mundanthurai	Tamil Nadu	Southernmost population

Tamil Nadu launched 'Project Nilgiri Tahr' in 2023 as India's first state-level species-specific conservation project for a caprine.

Prelims Pointers

- **Nilgiri Tahr:** Nilgiritragus hylocrius – endemic to southern Western Ghats.
- **IUCN:** Endangered; WPA Schedule I.
- **State animal:** Tamil Nadu.
- **Project Nilgiri Tahr:** launched 2023 by TN.
- **Stronghold:** Eravikulam NP, Kerala.

MUGGER CROCODILE – TAMIL NADU'S FIRST STATE-WIDE SURVEY

The Tamil Nadu Forest Department conducted a state-wide survey to map the population of mugger crocodiles (Crocodylus palustris) – a first-of-its-kind exercise for the species in the state.

News in Brief

- Scientific name: Crocodylus palustris; common name 'Marsh Crocodile' or 'Mugger'.
- IUCN status: Vulnerable; listed in Schedule I of the Wildlife (Protection) Act, 1972.
- Found in freshwater habitats across South Asia and Iran; one of the three crocodylians in India (Mugger, Saltwater, Gharial).
- Distinctive for its broad snout (hence 'mugger', from Sanskrit 'makara').
- Key Indian habitats: Madras Crocodile Bank Trust (TN), Sardar Sarovar backwaters (GJ), Chambal (MP).
- State animal of Chhattisgarh is the state's only crocodylian – the mugger.

Prelims Connect

INDIA'S THREE CROCODILIANS

Species	Habitat	IUCN Status
Mugger (<i>Crocodylus palustris</i>)	Freshwater rivers, lakes	Vulnerable
Saltwater (<i>Crocodylus porosus</i>)	Estuaries, mangroves (Bhitarkanika)	Least Concern
Gharial (<i>Gavialis gangeticus</i>)	Chambal, Ganga, Son rivers	Critically Endangered

Project Crocodile was launched in 1975 with UNDP & FAO support – one of India's oldest species recovery programmes.

Prelims Pointers

- **Mugger:** *Crocodylus palustris* – freshwater crocodile.
- **IUCN:** Vulnerable; WPA Schedule I.
- **India's three crocs:** Mugger, Saltwater, Gharial.
- **Project Crocodile:** launched 1975.
- **Largest freshwater site:** National Chambal Sanctuary.

EURASIAN OTTER – REDISCOVERED IN KASHMIR AFTER 30 YEARS

The Eurasian otter (*Lutra lutra*) has been rediscovered in Kashmir after being presumed extinct from the Valley for nearly three decades. Sightings have also resurfaced over the last three years.

News in Brief

- Scientific name: *Lutra lutra*; one of three otter species found in India.
- IUCN status: Near Threatened; listed in Schedule II of the WPA, 1972.
- Preferred habitat: clean, fast-flowing mountain streams and rivers.
- Disappeared from Kashmir in the 1990s due to water pollution, sand mining and poaching.
- Kashmir rediscovery points to improved water quality in some mountain streams.
- India has three otter species: Eurasian (*Lutra lutra*), Smooth-coated (*Lutrogale perspicillata*), Small-clawed (*Aonyx cinereus*).

Prelims Connect

INDIA'S OTTER SPECIES

Species	Habitat	IUCN
Eurasian Otter (<i>Lutra lutra</i>)	Himalayan streams, Western Ghats, NE	Near Threatened
Smooth-coated (<i>Lutrogale perspicillata</i>)	Lowland rivers, wetlands	Vulnerable
Small-clawed (<i>Aonyx cinereus</i>)	Eastern Himalaya, Western Ghats, NE	Vulnerable

Otters are 'indicator species' – their presence signals healthy, low-pollution rivers. All three Indian species are on CITES Appendix I.

Prelims Pointers

- **Eurasian otter:** *Lutra lutra* – rediscovered in Kashmir.
- **IUCN:** Near Threatened; CITES Appendix I.
- **India's otter species:** Eurasian, Smooth-coated, Small-clawed.
- **Role:** apex freshwater predator + indicator of clean rivers.
- **Threats:** pollution, sand mining, poaching for fur.

PALLAS'S CAT (MANUL) – FIRST PHOTOGRAPHIC EVIDENCE IN HIMACHAL

The first photographic evidence of the elusive Pallas's cat (also known as manul) in Himachal Pradesh has been recorded – a significant addition to India's cold-desert carnivore map.

News in Brief

- Scientific name: *Otocolobus manul*; also called 'manul' – a small, stocky wild cat about the size of a domestic cat.
- IUCN status: Least Concern (but local populations are declining).
- Listed in Appendix II of CITES.
- Habitat: Trans-Himalayan cold deserts, steppe and high-altitude grasslands between 3,000 and 5,000 m.
- Known range in India: Ladakh (Hemis NP, Changthang); now Himachal Pradesh (first photo).
- Distinguished by its flat face, short legs and long dense fur – the densest coat of any felid.

Prelims Connect

INDIA'S HIGH-ALTITUDE FELIDS

Species	Habitat
Snow Leopard (<i>Panthera uncia</i>)	Ladakh, HP, Uttarakhand, Sikkim, AP – 3000-5500 m
Pallas's Cat (<i>Otocolobus manul</i>)	Ladakh, HP – cold deserts
Eurasian Lynx (<i>Lynx lynx</i>)	Ladakh, HP
Asiatic Wildcat	Desert and scrub

Pallas's cats have round pupils (unlike other small cats' vertical slits) and cannot sprint fast – relying on cover and ambush.

Prelims Pointers

- **Pallas's Cat:** *Otocolobus manul*.
- **IUCN:** Least Concern; CITES Appendix II.
- **First photo in HP:** confirms range expansion.
- **Habitat:** Trans-Himalayan cold desert, 3000–5000 m.
- **Unique:** round pupils; densest fur of any cat.

SAFFRON REEDTAIL – RARE DAMSELFLY SPOTTED

Two naturalists spotted the saffron reedtail, a rare species of damselfly endemic to the Western Ghats, after years of no confirmed records in parts of its range.

News in Brief

- Scientific name: *Indosticta deccanensis*; family Platystictidae.
- A rare damselfly endemic to the Western Ghats biodiversity hotspot.
- Habitat: fast-flowing, forested streams with high humidity and dense shade.

- Serves as an indicator of stream health and old-growth forest cover.
- Damselflies (suborder Zygoptera) differ from dragonflies (Anisoptera) by folding their wings above their bodies at rest.
- Western Ghats holds approximately 30 endemic odonate species – many not seen for decades.

Prelims Connect

WHY DAMSELFLIES MATTER FOR UPSC

Aspect	Detail
Order	Odonata (damselflies + dragonflies)
Sub-order	Zygoptera (damselflies)
Endemic Hotspot	Western Ghats – ~30 endemic species
Ecological Role	Indicator of clean, shaded forest streams
Threats	Deforestation, dam construction, pollution

Odonates are among the oldest flying insects – their ancestors (Meganeura) had 70 cm wingspans in the Carboniferous era.

Prelims Pointers

- **Saffron Reedtail:** *Indosticta deccanensis* – Western Ghats endemic damselfly.
- **Order:** Odonata; sub-order Zygoptera.
- **Indicator role:** forested stream quality.
- **Hotspot:** Western Ghats – UNESCO WHS + Global 200.
- **Fun fact:** Odonate ancestors had 70 cm wingspans (Carboniferous era).

CROCODILE CATFISH – NEW DISCOVERY IN BAHINI RIVER, ASSAM

A Crocodile Catfish has been discovered in the Bahini River, a tributary of the Brahmaputra in Assam – marking a new record for the species in this river system.

News in Brief

- Scientific name: *Heteropneustes longipectoralis* (a catfish of the family Heteropneustidae).
- Air-breathing catfish common to the Brahmaputra and Ganga river systems.
- Called 'Crocodile Catfish' for its armoured head and wide jaws resembling a crocodile.
- Bahini River is a left-bank tributary of the Brahmaputra in lower Assam.
- Air-breathing catfishes can survive in hypoxic waters using a modified gas-exchange organ.
- India's freshwater fish biodiversity is one of the richest globally, with over 800 species.

Prelims Connect

IMPORTANT FRESHWATER FISH IN NEWS (INDIA)

Species	Notes
Mahseer (<i>Tor</i> spp.)	'Tiger of the river' – endangered game fish
Hilsa (<i>Tenualosa ilisha</i>)	Anadromous; national fish of Bangladesh

Snakeheads (Channa)	Several endemic Western Ghats species
Crocodile Catfish	Brahmaputra river system record
Gobies (Schismatogobius)	New species described from Collaroy / Cauvery

India has five mega-diverse river systems: Indus, Ganga, Brahmaputra, Godavari, Krishna – each home to unique fish assemblages.

Prelims Pointers

- **Crocodile Catfish:** recorded in Bahini River, Assam.
- **River:** Bahini – left-bank tributary of Brahmaputra.
- **Family:** Heteropneustidae – air-breathing catfish.
- **India's fish diversity:** 800+ freshwater species.
- **Zoological Survey of India (ZSI):** national nodal body for species description.

SAOLA – GENOME MAPPED FOR THE FIRST TIME

An international team of scientists has successfully mapped the genome of the Saola (*Pseudoryx nghetinhensis*), one of the rarest mammals on Earth, also called the 'Asian unicorn'.

News in Brief

- Scientific name: *Pseudoryx nghetinhensis*.
- Discovered only in 1992 in the Annamite mountains on the Vietnam–Laos border.
- IUCN status: Critically Endangered; possibly fewer than 100 individuals remain in the wild.
- Often nicknamed the 'Asian unicorn' because of its two parallel horns and rarity.
- Genome mapping provides a basis for conservation breeding and for distinguishing captive candidates.
- Not found in India but an important species for the biodiversity hotspot of Indo-Burma.

Prelims Connect

'ASIAN UNICORN' QUICK FACTS

Attribute	Value
Discovered	1992 (Vu Quang Nature Reserve, Vietnam)
Range	Annamite Mountains, Vietnam–Laos border
Population	<100 (estimated)
IUCN	Critically Endangered
Relatives	Closer to wild cattle (Bovini) than to antelopes

The Saola was the first large mammal new to science in over 50 years when described in 1992. No zoo currently holds it alive.

Prelims Pointers

- **Saola:** *Pseudoryx nghetinhensis* – 'Asian unicorn'.
- **Discovered:** 1992, Vietnam–Laos border (Annamite Mts).
- **IUCN:** Critically Endangered; <100 individuals.

- **Hotspot:** Indo-Burma biodiversity hotspot.
- **Newsworthy:** first complete genome mapped (2025).

SLITEYE SHARK – FIRST RECORD IN CHAGOS ARCHIPELAGO

Scientists recently spotted a sliteye shark (*Loxodon macrorhinus*) for the first time in the Chagos Archipelago of the Indian Ocean – confirming a new range for the species.

News in Brief

- Scientific name: *Loxodon macrorhinus*.
- IUCN status: Near Threatened.
- Family: Carcharhinidae (requiem sharks).
- Small coastal shark found in tropical Indo-Pacific waters.
- Chagos Archipelago includes Diego Garcia and lies in the central Indian Ocean – one of the world's largest marine protected areas.
- The ICJ has ruled on the Chagos sovereignty question in favour of Mauritius in recent years.

Prelims Connect

CHAGOS ARCHIPELAGO – WHY IT'S IN NEWS

Fact	Detail
Location	Central Indian Ocean, ~500 km south of Maldives
Islands	60+ islands; Diego Garcia is the largest
Sovereignty	UK-administered; Mauritius claims; 2019 ICJ advisory + 2024 transfer deal
Marine PA	One of the world's largest Marine Protected Areas (640,000 sq km)
Key biodiversity	Corals, sharks, seabirds; >200 coral species

The sliteye shark gets its name from a distinctive horizontal slit in its eye. Chagos serves as a critical shark refuge in the Indian Ocean.

Prelims Pointers

- **Sliteye Shark:** *Loxodon macrorhinus* – first record in Chagos.
- **IUCN:** Near Threatened.
- **Chagos MPA:** 640,000 sq km – one of world's largest.
- **ICJ ruling (2019):** UK to end administration of Chagos; Mauritius claim upheld.
- **Diego Garcia:** US-UK joint military base.

PIRATULA ACUMINATA – NEW WOLF SPIDER FROM SUNDARBANS

A new wolf spider species, named *Piratula acuminata*, has been discovered in the Sundarbans region of West Bengal – adding to India's growing arachnid diversity records.

News in Brief

- Family: Lycosidae (wolf spiders), named for their powerful pouncing hunting style.
- Genus *Piratula* – typically found near water bodies and wetlands.
- The Sundarbans mangrove ecosystem is among the world's most biodiverse and hosts many undescribed invertebrates.

- Wolf spiders are apex invertebrate predators in wetland ecosystems; they do not spin webs to catch prey.
- The description was published in a peer-reviewed taxonomy journal in 2025.
- India has over 1,800 described spider species; global estimates place the true number at 30,000+.

Prelims Connect

SUNDARBANS AT A GLANCE

Attribute	Detail
Biogeographic zone	Deltaic (Ganga–Brahmaputra–Meghna)
UNESCO WHS	1987
Biosphere Reserve	1989
Ramsar Site	2019
Flagship species	Royal Bengal Tiger, Estuarine crocodile, Gangetic dolphin

New species discoveries from the Sundarbans routinely include insects, spiders, fish and fungi – reflecting its status as an under-explored biodiversity hotspot.

Prelims Pointers

- **Piratula acuminata:** new wolf spider from Sundarbans.
- **Family:** Lycosidae.
- **Sundarbans:** UNESCO WHS + Biosphere + Ramsar.
- **Spiders in India:** 1,800+ described species.
- **Role:** apex invertebrate predator (no web).

INDIAN WOLF – POTENTIAL DISTINCT SPECIES

The IUCN has identified the Indian wolf (*Canis lupus pallipes*) as a potential distinct species, based on genetic and morphological evidence indicating deep evolutionary divergence from other grey wolves.

News in Brief

- Scientific name: *Canis lupus pallipes*.
- IUCN status: Endangered (as a subspecies); Schedule I of the WPA, 1972.
- Smallest of all grey wolf subspecies; adapted to semi-arid scrub forests and grasslands.
- Stronghold: Velavadar Blackbuck NP (Gujarat), Solapur (Maharashtra), Rajasthan.
- The Indian wolf diverged from other grey wolves about 400,000–800,000 years ago – one of the oldest wolf lineages.
- If confirmed as a distinct species, the population would qualify as 'Critically Endangered' with fewer than 3,000 individuals.

Prelims Connect

WOLVES OF INDIA

Sub-species / Species	Range
Indian Wolf (<i>Canis lupus pallipes</i>)	Peninsular India; Gujarat, MH, RJ, MP

Himalayan Wolf (<i>Canis lupus chanco/ C. himalayensis</i>)	Ladakh, Spiti, high Himalaya
Dhole (<i>Cuon alpinus</i>)	Western Ghats, Central India – NOT a wolf, but a wild dog

*The Himalayan wolf is already recognised by some taxonomists as a distinct species (*Canis himalayensis*). Indian wolf genetic studies may soon lead to similar split.*

Prelims Pointers

- **Indian Wolf:** *Canis lupus pallipes* – potential distinct species.
- **IUCN:** Endangered subspecies.
- **Stronghold:** Velavadar NP, Gujarat.
- **Divergence age:** 400,000–800,000 years ago.
- **Himalayan Wolf:** already treated as distinct by some (*C. himalayensis*).

GREEN SEA TURTLE – IUCN UPGRADES GLOBAL STATUS

The IUCN has upgraded the global status of the green sea turtle (*Chelonia mydas*) to 'Least Concern' after sustained conservation gains over decades – but regional populations (including in India) remain at risk.

News in Brief

- Scientific name: *Chelonia mydas*.
- Previous IUCN status: Endangered; revised to Least Concern globally in 2025.
- Listed in Schedule I of the WPA 1972 and Appendix I of CITES – full protection continues.
- India hosts major nesting sites at Gahirmatha, Rushikulya (Odisha), and parts of the Andaman & Nicobar Islands.
- Green turtles are herbivorous as adults, feeding on seagrass and algae.
- Named for the greenish colour of their body fat, not shell.

Prelims Connect

SEA TURTLES OF INDIA

Species	IUCN Status	Nesting Site
Olive Ridley (<i>Lepidochelys olivacea</i>)	Vulnerable	Gahirmatha, Rushikulya (OD), Versova (MH)
Green Turtle (<i>Chelonia mydas</i>)	Least Concern (globally)	A&N Islands; Gulf of Mannar
Hawksbill (<i>Eretmochelys imbricata</i>)	Critically Endangered	A&N Islands
Loggerhead (<i>Caretta caretta</i>)	Vulnerable	Rare; A&N
Leatherback (<i>Dermochelys coriacea</i>)	Vulnerable	Great Nicobar Island

India's sea turtle policy operates under Operation Olivia (Indian Coast Guard) and the Wildlife Institute of India's monitoring programme.

Prelims Pointers

- **Green turtle:** *Chelonia mydas* – IUCN upgraded to Least Concern (2025).

- **India schedule:** Schedule I of WPA 1972 (still fully protected).
- **India's sea turtles:** Olive Ridley, Green, Hawksbill, Leatherback, Loggerhead.
- **Operation Olivia:** Indian Coast Guard – protects Olive Ridley nesting.
- **Rushikulya:** mass nesting (arribada) site in Odisha.

OLIVE RIDLEY – MASS NESTING RETURNS TO RUSHIKULYA

The Olive Ridley turtles, an endangered species which had skipped the River Rushikulya mouth in Odisha the previous year, returned for mass nesting – delighting forest officials and ecologists.

News in Brief

- Scientific name: *Lepidochelys olivacea*.
- IUCN status: Vulnerable; Schedule I of the WPA 1972.
- India hosts the world's largest mass nesting sites – Gahirmatha (largest in world), Rushikulya, Devi river mouth.
- The phenomenon is called '**arribada**' (Spanish for 'arrival') – tens of thousands of females nesting together.
- Nesting season: typically between November and May along India's east coast.
- Threats: fishing nets (TEDs recommended), beach erosion, coastal lighting.

Prelims Connect

OPERATION OLIVIA – FIVE KEY POINTS

Point	Detail
Launched by	Indian Coast Guard
Year	Early 1980s (annual)
Duration	November to May – full breeding season
Objective	Safeguard Olive Ridley nesting & nesting females
Tools	TED (Turtle Excluder Device) enforcement, patrol vessels

The Odisha coast (Gahirmatha, Rushikulya, Devi) supports ~50% of the world's Olive Ridley mass nesting.

Prelims Pointers

- **Olive Ridley:** *Lepidochelys olivacea* – Vulnerable.
- **Arribada:** mass nesting phenomenon.
- **Indian sites:** Gahirmatha (largest), Rushikulya, Devi river mouth.
- **Operation Olivia:** Indian Coast Guard's annual turtle protection campaign.
- **TED:** Turtle Excluder Device in fishing trawler nets.

RED-NECKED PHALAROPE – NEW SIGHTING AT NANJARAYAN BIRD SANCTUARY

A rare Red-necked Phalarope (*Phalaropus lobatus*) was sighted for the first time at the Nanjarayan Bird Sanctuary in Tamil Nadu's Tiruppur district – a range-expansion record for the species.

News in Brief

- Scientific name: *Phalaropus lobatus*.
- IUCN status: Least Concern, but rare in inland India.

- Tiny pelagic wader (14–17 cm) famous for its unusual 'reversed' sex roles – males incubate eggs while females are more colourful.
- Breeds in the Arctic tundra; winters in tropical oceans and coastal wetlands.
- Nanjarayan Tank is a shallow wetland near Tiruppur, Tamil Nadu.
- Declared a Bird Sanctuary by the Tamil Nadu government in 2022.

Prelims Connect

UNIQUE PHALAROPE FACTS

Feature	Detail
Order / Family	Charadriiformes / Scolopacidae
Migration	One of the longest migrations of any small bird
Foraging	Spins rapidly in water to stir up plankton
Sex-role reversal	Females more colourful; males incubate
Winter grounds	Tropical oceans – rare inland sightings

Nanjarayan is one of Tamil Nadu's 'new-generation' bird sanctuaries notified to bolster the state's wetland network that now tops India with 18 Ramsar sites.

Prelims Pointers

- **Red-necked Phalarope:** Phalaropus lobatus.
- **Sex-role reversal:** males incubate; females more colourful.
- **Sighting site:** Nanjarayan Bird Sanctuary, Tiruppur, TN.
- **Breeding range:** Arctic tundra.
- **Foraging style:** spinning-in-water to stir plankton.

TWO NEW GOBY FISH SPECIES – ZSI DISCOVERY FROM COASTAL WATERS

Researchers from the Zoological Survey of India (ZSI) discovered two new goby fish species in Indian coastal estuarine waters – adding to the country's growing list of taxonomic firsts.

News in Brief

- Gobies belong to the family Gobiidae – the largest family of marine fishes with 2,000+ species.
- Both species are small, less than 5 cm in total length; adapted to brackish, estuarine waters.
- The discoveries were made using both morphological and DNA-based taxonomy.
- ZSI (founded 1916) is India's nodal body for faunal taxonomy and biodiversity documentation.
- India's coastal and marine fish fauna continues to be under-surveyed; new species descriptions are frequent.
- Gobies include the world's smallest vertebrates (Schindleria brevipinguis, 8 mm).

Prelims Connect

ZOOLOGICAL SURVEY OF INDIA – QUICK FACTS

Attribute	Detail
Founded	1916

Headquarters	Kolkata
Parent ministry	MoEFCC
Mandate	Faunal surveys, taxonomy, distribution mapping
Key publication	Fauna of India series; National Red List

India's National Red List of species was launched by ZSI/MoEFCC during the 2025 IUCN World Conservation Congress in Abu Dhabi.

Prelims Pointers

- **Goby discovery:** two new species by ZSI from Indian coastal waters.
- **Family:** Gobiidae – 2,000+ species, largest marine fish family.
- **ZSI:** founded 1916, HQ Kolkata – India's taxonomy nodal body.
- **National Red List:** launched 2025 at IUCN WCC Abu Dhabi.
- **Fun fact:** gobies include the world's smallest vertebrates (8 mm).

ASIAN GORAL – FIRST SUCCESSFUL ARTIFICIAL INCUBATION IN INDIA

The Manipur Zoological Garden achieved India's first successful artificial incubation and rearing of the Asian goral (*Naemorhedus goral*) – a significant milestone for ex-situ breeding.

News in Brief

- Scientific name: *Naemorhedus goral*.
- IUCN status: Near Threatened.
- Listed in Schedule I of the Wildlife (Protection) Act, 1972; CITES Appendix I.
- A small goat-antelope inhabiting the steep, forested slopes of the Himalayas and NE hill ranges.
- Range: Kashmir to Arunachal Pradesh and Indo-Burma border areas.
- Ex-situ breeding is especially critical for endangered caprines because they are difficult to census in the wild.

Prelims Connect

ASIAN GORAL – KEY DATA

Attribute	Detail
Scientific name	<i>Naemorhedus goral</i>
Body weight	25–35 kg
Habitat	Rocky forested slopes 1,000–4,000 m
Range	Himalaya + NE India
Threats	Habitat loss, hunting, livestock-borne diseases

Gorals are sometimes confused with serows (*Capricornis species*) – serows are larger and have a mane.

Prelims Pointers

- **Asian Goral:** *Naemorhedus goral*.
- **IUCN:** Near Threatened.

- **First artificial incubation in India:** Manipur Zoo.
- **Range:** Himalaya + NE India.
- **Similar species:** Serow (larger, with mane).

ULTRA-RARE LEOPARD COLOR VARIANT – KARNATAKA FIRST

Karnataka has recorded its first-ever sighting of an ultra-rare color variant of a leopard, dubbed by biologists as a 'strawberry' or 'erythristic' leopard due to its reddish-orange coat.

News in Brief

- Scientific name of leopard: *Panthera pardus*.
- Erythrism is a rare genetic condition producing excessive red/orange pigmentation.
- Other leopard color variants: melanistic ('black panther'), pseudo-melanistic (Similipal tigers), albino (very rare).
- Karnataka is home to ~1,800 leopards – the highest in southern India.
- Bengaluru has been recognised as the 'Leopard Capital' of India, surpassing Mumbai in estimated populations.
- Indian leopards are listed as Vulnerable (IUCN) and in Schedule I of WPA 1972.

Prelims Connect

LEOPARD COLOR VARIANTS – QUICK GLANCE

Variant	Cause	Example
Melanistic	Excess dark pigment (MC1R gene)	Black panther – common in Western Ghats
Pseudo-melanistic	Partial dark-stripping	Similipal tigers
Erythristic (strawberry)	Excess red/orange pigmentation	Karnataka leopard (2026 record)
Albinistic	Absence of melanin	Very rare
Leucistic	Reduced pigmentation (not albino)	Occasional tigers

Strawberry leopards had previously been seen only in South Africa – making the Karnataka sighting the first such confirmed record from Asia.

Prelims Pointers

- **Strawberry leopard:** erythristic *Panthera pardus* – first in Karnataka.
- **Cause:** erythrism – rare pigment mutation.
- **Bengaluru:** 'Leopard Capital of India'.
- **Karnataka leopards:** ~1,800 (highest in south India).
- **IUCN status:** Vulnerable; WPA Schedule I.

16TH ASIATIC LION CENSUS – GUJARAT REPORTS 891 LIONS

The population of Asiatic lions in Gujarat rose from 674 to 891, according to the 16th Lion Census 2025 – a 32% increase over the previous 5-year cycle.

News in Brief

- Scientific name: *Panthera leo persica* (or *leo leo* as per 2017 revision).

- IUCN status: Endangered.
- Population spread across Gir NP, Gir Wildlife Sanctuary, Girnar, Barda, Mitiyala, Pania and adjoining coastal areas of Gujarat.
- Gujarat is now undertaking the establishment of a Barda Dungar Wildlife Sanctuary as a second home for lions.
- Project Lion (2023) with ₹2,900 crore outlay covers the entire Asiatic lion landscape.
- Unlike tigers, Asiatic lions show female-centred prides (pride of 2–4 females with cubs); males are more solitary.

Prelims Connect

ASIATIC LION CENSUS TRAJECTORY

Year	Population
2005	359
2010	411
2015	523
2020	674
2025	891

Asiatic lions are smaller than African lions and have a distinctive longitudinal belly fold. They are found only in Gujarat's Saurashtra region.

Prelims Pointers

- **16th Lion Census (2025):** 891 Asiatic lions (up from 674).
- **Scientific name:** Panthera leo persica.
- **IUCN:** Endangered.
- **Only range in world:** Gujarat (Saurashtra).
- **Project Lion:** launched 2023 with ₹2,900 crore budget.

KING COBRA — MADHYA PRADESH REINTRODUCTION PLAN

After a King Cobra died at Bhopal's Van Vihar zoo, Madhya Pradesh announced a plan to reintroduce the species into suitable evergreen forest habitats — an ambitious ex-situ to in-situ conservation attempt.

News in Brief

- Scientific name: Ophiophagus hannah — the world's longest venomous snake (up to 5.5 m).
- IUCN status: Vulnerable; Schedule II of the WPA 1972.
- Unique among snakes: the only species to build a nest for its eggs and guard them.
- Its diet consists almost entirely of other snakes (hence Ophiophagus — 'snake-eater').
- Indian range: Western Ghats, Northeast India, Eastern Ghats fringes, Andaman Islands.
- Recent genetic studies have split the King Cobra into 4 distinct species (2024 publication).

Prelims Connect

KING COBRA — NEW SPECIES SPLIT (2024)

Species	Range

Ophiophagus hannah (Northern King Cobra)	India (north), Myanmar, Thailand, China
Ophiophagus bungarus (Sunda King Cobra)	Malay Peninsula, Sumatra, Java
Ophiophagus kaalinga (Western Ghats King Cobra)	Endemic to Western Ghats, India
Ophiophagus salvatana (Luzon King Cobra)	Philippine islands

The Western Ghats King Cobra (Ophiophagus kaalinga) is India-endemic – a major taxonomic discovery of 2024. 'Kaalinga' comes from a regional Kannada name for the King Cobra.

Prelims Pointers

- **King Cobra:** Ophiophagus hannah – world's longest venomous snake.
- **IUCN:** Vulnerable; WPA Schedule II.
- **Endemic Indian species:** Ophiophagus kaalinga (Western Ghats, 2024).
- **Unique behaviour:** only snake that builds a nest and guards eggs.
- **Diet:** primarily other snakes (Ophiophagus = snake-eater).

PALLIKARANAI RAMSAR WETLAND – MADRAS HC STEPS IN

The Madras High Court directed real estate developer Brigade Enterprises to restore encroached portions of the Pallikaranai Ramsar wetland – a landmark intervention for urban wetland protection.

News in Brief

- Pallikaranai is an urban freshwater marsh on the southern fringes of Chennai, Tamil Nadu.
- Declared a Ramsar Site in 2022; it is the only notified wetland of Chennai.
- Only 10% of its original extent (5,500 ha) survives due to garbage dumping and real estate encroachment.
- Supports over 115 bird species including migratory waders from the Central Asian Flyway.
- It is one of the few natural flood-buffer wetlands for Chennai – vital for urban climate resilience.
- Declared a Reserve Forest by Tamil Nadu government in 2007 to arrest further encroachment.

Prelims Connect

URBAN WETLANDS IN INDIA – IMPORTANT CASE STUDIES

Wetland	City	Status
Pallikaranai	Chennai	Ramsar (2022); only wetland of Chennai
Deepor Beel	Guwahati	Ramsar (2002); only Assam Ramsar
Bhoj	Bhopal	Ramsar (2002)
Sukhna	Chandigarh	Man-made urban reservoir
Rangbull/Dal	Srinagar	Dal Lake – iconic but not Ramsar

Urban wetlands act as flood buffers, groundwater rechargers and microclimate regulators – critical for climate-resilient cities.

Prelims Pointers

- **Pallikaranai:** Chennai's only Ramsar wetland.
- **Declared Ramsar:** 2022.

- **Reserve Forest status:** 2007 (TN govt).
- **Original extent:** 5,500 ha – only ~10% survives.
- **Role:** flood buffer for Chennai metropolitan region.

ELEPHANT POPULATION – SAIEE 2021-25 (FIRST DNA-BASED ESTIMATE)

WII released 'Status of Elephants in India' – 22,446 elephants (vs. 29,964 in 2017). A drop of 7,518 over eight years. The DNA-based method used for the first time is treated as a new monitoring baseline.

News in Brief

- SAIEE (Synchronous All-India Elephant Estimation) 2021–25: divided India into 100 sq. km cells, then into 4 sq. km grids, each uniquely coded for consistent spatial comparison.
- Key threats: fragmentation from commercial plantations (coffee, tea), invasive plants, farmland fencing, mining, developmental projects.
- India holds ~60% of global Asian elephant population.

Prelims Connect

STATE-WISE ELEPHANT DISTRIBUTION – TOP 6 STATES

State	Population
Karnataka	6,013 (highest)
Assam	4,159
Tamil Nadu	3,136
Kerala	2,785
Uttarakhand	1,792
Odisha	912

Prelims Pointers

- **Synchronous All-India Elephant Estimation – 2021–25; first use of DNA-based method.** SAIEE:
- **Nilgiri Biosphere Reserve, Brahmaputra floodplains, Rajaji and Corbett National Parks.** Key habitats:
- **electrocution, bait bombs, poisoning, road accidents, train collisions, hunting, habitat fragmentation.** Causes of elephant deaths:

MANGROVES – STATUS, M.S. SWAMINATHAN'S LEGACY & MISHTI SCHEME

News in Brief

- ISFR 2023: India has 4,991.68 km² of mangroves (0.15% of geographical area); increased by 16.68 km² between ISFR 2019 and 2023.
- State distribution: West Bengal (42.45%) | Gujarat (23.32%) | A&N Islands (12.19%) | Andhra Pradesh (8.44%) | Maharashtra (6.51%) | Odisha (5.13%).

M.S. Swaminathan's Global Mangrove Initiatives

- Founded International Society for Mangrove Ecosystems (ISME) in 1990; produced World Mangrove Atlas.

- Drafted Charter for Mangroves, integrated into the World Charter for Nature (1992).
- Developed GLOMIS (Global Mangrove Database & Information System).
- Developed fishbone canal method for hydro-ecological mangrove restoration.
- Mangroves played major protective role during 1999 Odisha super cyclone and 2004 Indian Ocean tsunami.

MISHTI Scheme

- MISHTI (Mangrove Initiative for Shoreline Habitats and Tangible Incomes): launched 2023.
- Gujarat planted 19,000 ha in 2 years — surpassing Centre's 5-year target of 54,000 ha.
- Mangrove trees remove 10× more carbon from air than they transfer to soil. Store large amounts of blue carbon.
- IUCN warns over half of world's mangroves may collapse by 2050.
- Salt tolerance: some species exclude salt using waxy root layers; others accumulate and secrete salt through specialised leaf tissues. Evolved 30 times over the last 200 million years.

Prelims Pointers

- **Mangrove Initiative for Shoreline Habitats and Tangible Incomes — launched 2023.** MISHTI:
- **carbon captured and stored by mangroves, seagrasses, and other coastal ecosystems.** Blue carbon:

CORAL BLEACHING — 4TH GLOBAL EVENT (2023-24)

News in Brief

- International Coral Reef Initiative: 84% of global coral reef areas affected by mass bleaching — FOURTH global bleaching event since 1998 (surpassing all previous events).
- 1st (1998): 20% | 2nd (2010): 35% | 3rd (2014-17): 56% | 4th (2023-24): 84%.
- Corals host zooxanthellae algae in symbiotic relationship — provide oxygen, photosynthetic products, and colour. Stress (heat) causes expulsion → bleaching; bleaching does not immediately kill corals but reduces reproductivity.
- Great Barrier Reef: suffered worst coral loss in 40 years; coral cover declined 14-30%.
- Lakshadweep 24-year study (Agatti, Kadmat, Kavaratti atolls): coral cover dropped from 37.24% to 19.6% (50% reduction from 1998 baseline) due to three ENSO events. Recovery rates dramatically increased after six bleaching-free years.

SNAP-X Innovation & NCRRI

- SNAP-X ink: made from compounds from healthy algae, nanoparticles, and soft gel — solidifies under light when applied to reef surfaces. Mimics chemical signals from healthy reefs to guide floating coral larvae.
- National Coral Reef Research Institute (NCRRI): Government to set up in Andaman and Nicobar Islands at ₹120 crore — will function as nodal and monitoring agency for coral reef research across India.

Prelims Pointers

- **Gulf of Kutch | Gulf of Mannar | Lakshadweep Islands | Andaman and Nicobar Islands.** India's reef areas:
- **symbiotic algae living in coral tissues; provide colour, oxygen, and nutrients; expelled during bleaching.** Zooxanthellae:
- **5.7 million sq. km; Indonesia, Malaysia, Papua New Guinea, Philippines, Solomon Islands, Timor-Leste.** Home to 75% of world's coral species. Coral Triangle:

GREAT INDIAN BUSTARD — POWER CORRIDORS & CONSERVATION UPDATE

News in Brief

- SC-appointed expert committee proposed designated power corridors for transmission lines in Gujarat-Rajasthan.
- Revised GIB conservation zones: Rajasthan – 14,013 sq km; Gujarat – 740 sq km.
- Corridors: 5 km wide in Rajasthan; 1-2 km wide in 2 separate zones in Gujarat. No new overhead power lines, wind turbines, or solar plants >2 MW in priority areas.
- 4,200 sq km GIB habitat in and around Desert National Park, Rajasthan.
- Fewer than 150 GIBs remain – found only in India (most in Rajasthan – state bird of Rajasthan). IUCN: Critically Endangered. WPA Schedule I.

Prelims Pointers

- **Great Indian Bustard – one of heaviest flying birds in the world; disappeared from 90% of its habitat. IUCN: Critically Endangered.** GIB:
- **CMS under Appendix I; CITES under Appendix I.** GIB is included in:
- **MoEFCC + Rajasthan + WII – conservation breeding centres (CBC) at Ramdevra and Sorsan.** 2018 tripartite agreement:
- **2024-2033; artificial insemination lab at Ramdevra from 2026.** Next conservation phase:

INVASIVE SPECIES – KEY EXAMPLES & IMPACTS IN INDIA

News in Brief

- Globally: 37,000 established alien species. India: 139 invasive alien species (mostly insect pests of crops).
- India lost \$127.3 billion to invasive species in 60 years – 2nd most affected globally after the USA.

Prelims Connect

KEY INVASIVE SPECIES IN INDIA

Species	Origin/Introduction	Impact
Lantana camara	British colonial period (ornamental)	Spreads across forests; disrupts elephant/herbivore movement; increases human-animal conflict
Prosopis juliflora (Mesquite)	South America and Caribbean, 19th century	Covers 50-60% of Banni grasslands; drains surface water; worsens soil salinity
Water hyacinth (Pontederia crassipes)	Colonial period as ornamental plant	Among 10 worst invasive species; affects Kaziranga, Vembanad Lake; decaying hyacinth releases methane
Giant African Snail (Lissachatina fulica)	Arrived in colonial Calcutta ~1847	India's most persistent IAS; crop damage; spreads rat lungworm parasite
Parthenium hysterophorus	Via US wheat under PL 480, 1955	Affects agriculture, forests, and human health

Prelims Pointers

- **highly invasive tree removed from Mudumalai Tiger Reserve with help of locals.** *Senna spectabilis*:

- **reduces native ant populations that control crop pests.** Yellow crazy ant (*Anoplolepis gracilipes*):
- **to control aquatic invasive species via shipping.** Ballast Water Management Convention:

STATE TREES OF INDIA – QUICK REFERENCE

Prelims Connect

STATE TREES – CULTURAL AND RELIGIOUS CONNECTIONS

Tree	State / National Status	Cultural Connection
Banyan tree	National tree of India; Gujarat and MP	Sacred in Hinduism, Buddhism (Kashyapa Buddha), Jainism (Neminatha)
Pipal tree	Haryana, Bihar, Odisha	Buddha attained enlightenment; linked to Parshvanath (23rd Jain Tirthankara)
Sal tree	Chhattisgarh and Jharkhand	Mentioned in Ramayana; linked to Buddha's birth and death; Munisuvrata (20th Tirthankara)
Ashoka tree	UP; its flower = state flower of Odisha	Sacred in Ramayana
Khejri / Shami tree	Telangana and Rajasthan	Linked to Mahabharata, warrior traditions, Harappan seals
Mango tree	Maharashtra and Chandigarh	Used in Hindu rituals
Deodar	Himachal Pradesh	Linked to Shiva; 'Devadaru' = tree of the gods
Rhododendron	Sikkim and Uttarakhand	Offered to Nandadevi goddess
Sandalwood	Karnataka	Used for Vishnu worship
Coconut tree	Goa and Kerala	—
Toddy palm	Tamil Nadu	Linked to Balaram
Hollong	Assam and Arunachal Pradesh	—

CLIMATE CHANGE & INTERNATIONAL AGREEMENTS

COP30 BELÉM – THE 'FORESTS COP' IN THE AMAZON

COP30 – the 30th Conference of Parties to the UN Framework Convention on Climate Change (UNFCCC) – was held in Belém, Brazil, at the mouth of the Amazon river. At COP30, India announced it will host the Global Big Cats Summit in 2026 and backed the Tropical Forests Forever Facility (TFFF).

News in Brief

- **Host city: Belém, Pará state, Brazil** – the 'gateway to the Amazon'.
- President of COP30: André Aranha Corrêa do Lago (Brazilian diplomat).
- **Also called the 'Forests COP'** – positioned the Amazon at the centre of global climate action.
- Brazil launched the Tropical Forests Forever Facility (TFFF) with an initial \$1 billion pledge to pay tropical countries for standing forests.
- **Key agenda items:** New Collective Quantified Goal (NCQG) on climate finance, updated NDCs, Loss & Damage Fund operationalisation, Adaptation Gap Report.
- First COP where the Baku to Belém Roadmap to 1.3 Trillion USD in climate finance was unveiled.

Prelims Connect

RECENT UNFCCC COPs – A QUICK TIMELINE

COP	Year	Host City	Outcome
COP26	2021	Glasgow, UK	Glasgow Climate Pact; coal 'phase-down'
COP27	2022	Sharm el-Sheikh, Egypt	Loss & Damage Fund agreed
COP28	2023	Dubai, UAE	First Global Stocktake; 'Transition Away from Fossil Fuels'
COP29	2024	Baku, Azerbaijan	NCQG finance target: \$300 bn/yr by 2035
COP30	2025	Belém, Brazil	'Forests COP'; TFFF launched; Baku to Belém 1.3T Roadmap
COP31	2026	TBD (Australia/Turkey bid)	

The New Collective Quantified Goal (NCQG) replaced the \$100 bn/yr goal from Copenhagen 2009. Under COP29 Baku, it was raised to \$300 bn/yr by 2035.

Prelims Pointers

- **COP30 venue:** Belém, Brazil (2025).
- **President:** André Aranha Corrêa do Lago.
- **Big launches:** TFFF + Baku-to-Belém 1.3T Roadmap.
- **UNFCCC:** adopted 1992 at Rio Earth Summit; in force 1994.
- **COP31 hosting bid:** Australia + Pacific Islands (leading) vs Turkey.

COP30 BELÉM – 'IMPLEMENTATION COP' – KEY OUTCOMES

Brazil hosted COP30 in Belém – strategic entry point to the Amazon rainforest. Called the 'Implementation COP', focused on converting commitments into action, guided by the Global Stocktake (GST).

News in Brief

- Brazil hosted the 1992 Earth Summit. Amazon = one of world's largest carbon sinks (150–200 billion tonnes).
- COP30 adopted Global Mutirão (Tupi-Guarani: 'collective efforts') – consensus agreement addressing NDCs, 1.5°C goal, Article 9 finance, trade-restrictive measures, and the implementation gap.

- 2024 marked the first year temperatures breached the 1.5°C threshold. Absence of the US weakened developed-country blocs.

Tropical Forests Forever Facility (TFFF)

- Brazil launched TFFF at Belém – an investment fund (not a donation), paying \$4/hectare/year to forest-protecting countries.
- Brazil: \$1 billion; Colombia: \$250 million. France, China, UAE expressed support without financial commitments.
- About 1/5th of TFFF fund to go to Indigenous peoples protecting forests.
- Investor funds routed via TFIF (Tropical Forest Investment Fund) into emerging market bonds, avoiding fossil fuels and deforestation-linked sectors.

Brazil's Climate Commitments

- Brazil became 2nd country to submit new NDC (UAE 1st, Panama 3rd) – 59%–67% emissions reduction covering all GHGs.
- 88% of Brazil's electricity from renewable sources. Global leader in biofuels.
- Brazil proposed a UN Climate Change Council linked to UNGA.

India at COP30

- India joined TFFF as 'Observer.' Emphasised climate justice and CBDR.
- India did NOT announce its updated NDC at COP30; NDC 3.0 expected to outline steps to reduce fossil fuel emissions by 2035.
- India reduced emission intensity of GDP by 36% (2005–2020); expanded carbon sink to 2.29 billion tonnes CO₂-eq (2005–21).
- India has not yet submitted its National Adaptation Plan to the UN.

Prelims Connect

COP31 & COP32 – UPCOMING HOSTS

COP31	Türkiye (Antalya) – Australia serves as President of Negotiations; pre-COP in Pacific Island nations
COP32	Ethiopia (Addis Ababa)
COP33 (2028)	India has expressed intention to host – would be 2nd time; India hosted COP-8 in New Delhi in 2002
Rotation system	5 UN-designated geographical regions: Africa, Asia-Pacific, Eastern Europe, Latin America & Caribbean, Western Europe & Others
Samauma tree	Sacred tree of the Amazon – 'queen of tropical forests'; 50–70 m tall; Malvaceae family (Kapok tree); 300–400 year lifespan; key role in rainfall cycle through evapotranspiration
Munduruku tribe	Brazilian Indigenous group; COP30 announced demarcation of 10 new Indigenous lands covering almost 1,000 sq miles
Global Mutirão text	Does NOT explicitly mention fossil fuels; emphasises adaptation, two-year work programme on climate finance

BAKU TO BELÉM ROADMAP TO 1.3 TRILLION USD

The UN launched the 'Baku to Belém Roadmap to 1.3 Trillion USD' – a framework to scale up climate finance for developing countries from the COP29 target of \$300 billion/yr to \$1.3 trillion/yr by 2035.

News in Brief

- Launched jointly by the COP29 Presidency (Azerbaijan) and COP30 Presidency (Brazil).
- Aims to mobilise climate finance from all sources – public, private, bilateral and multilateral.
- The \$1.3 trillion figure reflects the actual estimated needs of developing countries (per the Independent High-Level Expert Group on Climate Finance).
- Identifies reforms to Multilateral Development Banks (MDBs), innovative carbon markets, and sovereign green bonds.
- Addresses concerns that the \$300 bn/yr NCQG target is woefully inadequate for equitable climate action.
- Aligns with the 'Bridgetown Initiative' championed by Mia Mottley of Barbados.

Prelims Connect

CLIMATE FINANCE – KEY TARGETS & MILESTONES

Milestone	Amount	Status
Copenhagen Commitment (COP15, 2009)	\$100 bn/yr by 2020	Missed; later met 2022
NCQG (COP29, Baku 2024)	\$300 bn/yr by 2035	Adopted
Baku-to-Belém Roadmap (COP30)	\$1.3 trillion/yr by 2035	Aspirational framework
Loss & Damage Fund	~\$700 mn pledged	Operational

The Adaptation Finance Gap Report (UNEP) places the annual adaptation finance need of developing countries at \$215–387 bn – several times current flows.

Prelims Pointers

- **Baku-to-Belém Roadmap:** targets \$1.3 trillion/yr climate finance by 2035.
- **Origin:** joint launch by COP29 & COP30 Presidencies.
- **NCQG:** \$300 bn/yr by 2035 (COP29 Baku).
- **Copenhagen Pledge:** \$100 bn/yr by 2020 (finally met 2022).
- **Bridgetown Initiative:** spearheaded by PM Mia Mottley of Barbados.

BONN CLIMATE CHANGE CONFERENCE 2025 (SB62)

The Bonn Climate Change Conference 2025 (SB62) took place from June 16-26 in Bonn, Germany. It is the annual mid-year meeting of the UNFCCC subsidiary bodies that prepares the agenda for the end-year COP.

News in Brief

- Hosted by the UNFCCC Secretariat in Bonn (its headquarters).
- SB = Subsidiary Body; two bodies meet – SBSTA (Science & Technology) and SBI (Implementation).
- SB62 laid the technical groundwork for COP30 negotiations at Belém.
- Key issues: new NDCs pipeline, Adaptation Global Goal indicators, Article 6 carbon market rules, Just Transition Work Programme.

- India consistently pushed for 'equity and CBDR-RC' (Common But Differentiated Responsibilities – Respective Capabilities).
- The Loss & Damage Fund board's first allocations were tabled for review at Bonn.

Prelims Connect

UNFCCC STRUCTURE

Body	Role
COP (Conference of Parties)	Supreme decision-making body; meets yearly
SBSTA	Subsidiary Body for Scientific and Technological Advice
SBI	Subsidiary Body for Implementation
Secretariat	Bonn, Germany – supports all UNFCCC processes
CMA	Meeting of Parties to Paris Agreement – held jointly with COP

The UNFCCC was adopted at Rio in 1992 and entered into force on 21 March 1994. India ratified it on 1 November 1993.

Prelims Pointers

- **Bonn Climate Change Conference:** SB62 (June 2025).
- **SBSTA:** Subsidiary Body for Scientific & Technological Advice.
- **SBI:** Subsidiary Body for Implementation.
- **HQ:** Bonn, Germany (UNFCCC Secretariat).
- **India position:** Equity + CBDR-RC.

LOSS & DAMAGE FUND – US WITHDRAWAL

The United States has withdrawn from the UN's Loss and Damage Fund (LDF), created at COP28 to help vulnerable nations cope with climate-induced harm. President Trump's executive order also directed the US to withdraw (again) from the Paris Agreement.

News in Brief

- Loss & Damage Fund was agreed at COP27 Sharm el-Sheikh (2022), operationalised at COP28 Dubai (2023).
- The World Bank is the interim trustee for four years.
- Initial capitalisation: approximately \$700 million pledged – far short of estimated needs.
- Fund targets climate-vulnerable developing countries facing permanent damage from climate impacts.
- US withdrawal signals a significant funding gap and political strain on loss-and-damage architecture.
- The Trump executive order also directed exit from the Paris Agreement for the second time (first exit: 2017–21).

Prelims Connect

LOSS & DAMAGE – KEY MILESTONES

Year	Milestone
2007 Bali	L&D recognised for first time in formal UNFCCC text

2013 Warsaw	Warsaw International Mechanism for L&D established
2015 Paris	Article 8 on L&D included in Paris Agreement
2022 Sharm	Loss & Damage FUND formally agreed
2023 Dubai	Fund operationalised; World Bank interim trustee
2025	US withdrawal; pledges re-opened

The Santiago Network for Loss and Damage provides technical assistance. Climate-vulnerable countries (V20 group) demand at least \$400 bn/yr for L&D.

Prelims Pointers

- **Loss & Damage Fund:** operationalised at COP28 Dubai (2023).
- **Interim trustee:** World Bank (4-year term).
- **US withdrawal:** ordered by executive order, 2025.
- **Paris Agreement:** US withdrew for 2nd time in 2025.
- **Warsaw International Mechanism (WIM):** 2013 framework for L&D.

INDIA'S NEW BILATERAL CLIMATE PARTNERSHIPS – GERMANY & NETHERLANDS

India and Germany announced a €20 million climate resilience initiative to strengthen adaptation in vulnerable Indian states. Separately, the Department of Science and Technology (DST) and the Netherlands launched the India-Netherlands Working Group on Climate and Sustainability.

News in Brief

- Indo-German Initiative: €20 million for adaptation in climate-vulnerable Indian states.
- Focus: water management, disaster risk reduction, sustainable land use.
- Implemented under the Indo-German Climate and Sustainable Development Partnership (IGCSDP).
- India-Netherlands Working Group: launched under DST-Dutch Ministry of Infrastructure cooperation.
- Focus: flood risk, delta planning, water technology, circular economy.
- Builds on the Netherlands' expertise with the Room for the River delta management programme.

Prelims Connect

INDIA'S BILATERAL CLIMATE PARTNERSHIPS (SELECT)

Partner	Key Initiative
Germany	Indo-German Climate & Sustainable Development Partnership; €20 mn adaptation fund
France	International Solar Alliance (ISA); Bhikhaji Cama Act
Japan	India-Japan Clean Energy Partnership; Hydrogen & Ammonia cooperation
UK	India-UK Roadmap 2030; Green Growth Equity Fund
Netherlands	India-Netherlands Climate & Sustainability Working Group (2025)
EU	TTC Working Group on Green & Clean Energy (2022)

India's climate diplomacy is built around two parallel tracks: multilateral (UNFCCC, ISA, CDRI) and bilateral (G7 partnerships).

Prelims Pointers

- **India-Germany:** €20 mn climate resilience initiative.
- **India-Netherlands:** DST-Dutch Working Group on Climate & Sustainability.
- **Room for the River:** Dutch flagship delta programme – model.
- **ISA:** International Solar Alliance (Paris 2015).
- **CDRI:** Coalition for Disaster Resilient Infrastructure (HQ New Delhi).

WMO CONFIRMS 2023–2025 AS THE HOTTEST THREE-YEAR PERIOD EVER

The World Meteorological Organization (WMO) has confirmed that 2023–2025 is the hottest three-year period on record, with global mean temperature anomalies repeatedly breaching the 1.5°C Paris threshold on monthly scales.

News in Brief

- Three consecutive record-breaking years driven by El Niño (2023–24), residual greenhouse gas forcing and ocean warming.
- 2024 was the first calendar year to cross 1.5°C above the 1850–1900 baseline.
- The 1.5°C Paris target is anchored to a 20-year running average, not a single year – so it is not yet officially 'breached'.
- Arctic sea-ice extent reached a near-record low in September 2025.
- Ocean heat content continued to climb – oceans absorb ~90% of the excess heat from greenhouse gases.
- WMO's annual 'State of the Climate' report warns of accelerating cryosphere loss, sea-level rise, and extreme events.

Prelims Connect

WMO – QUICK FACTS

Attribute	Detail
Founded	1950 (successor to IMO of 1873)
HQ	Geneva, Switzerland
Parent	UN Specialised Agency
Current Secretary-General	Celeste Saulo (first woman SG)
Key publication	State of the Global Climate; Global Annual Climate Statement

The Paris Agreement's 1.5°C target refers to a long-term global warming signal measured over at least 20 years. Single-year breaches are signals but not 'formal breach' of Paris.

Prelims Pointers

- **WMO confirmation:** 2023–2025 = hottest 3-year period ever.
- **WMO founded:** 1950; HQ Geneva.
- **Secretary-General:** Celeste Saulo (first woman, from Argentina).
- **Paris 1.5°C target:** 20-year running average benchmark.

- **Ocean heat:** absorbs ~90% of excess anthropogenic heat.

EMISSIONS GAP REPORT 2025 – INDIA'S EMISSIONS RISE HIGHEST

The UNEP's Emissions Gap Report 2025 confirmed that India recorded the highest rise in greenhouse gas emissions among major economies, even as total emissions per capita remain well below the global average.

News in Brief

- Published annually by the United Nations Environment Programme (UNEP) ahead of the UNFCCC COP.
- Measures the gap between current NDCs/projected emissions and what's needed for 1.5°C / 2°C Paris targets.
- 2025 Report: global emissions must fall ~42% by 2030 to stay within 1.5°C – current NDCs project just ~10% cuts.
- India's absolute emissions rose the most in 2024 (~6% YoY) but per-capita emissions remain ~1.9 t CO₂e (below world average of 6.8 t).
- G20 countries are collectively responsible for about 77% of global emissions.
- The report urged higher ambition in the new NDC cycle due by February 2025.

Prelims Connect

MAJOR EMISSIONS REPORTS – TRACKER

Report	Publisher	Focus
Emissions Gap Report	UNEP	NDC vs Paris target gap
Adaptation Gap Report	UNEP	Adaptation finance gap
Global Methane Tracker	IEA	Energy-sector methane emissions
Global Carbon Budget	Global Carbon Project	Annual CO ₂ emission inventory
Production Gap Report	UNEP/SEI	Fossil fuel production gap vs Paris

India's per-capita emissions (~1.9 t CO₂e) remain less than one-third of the global average (~6.8 t) – a recurring equity argument.

Prelims Pointers

- **Emissions Gap Report:** published by UNEP.
- **India highlight:** highest rise in 2024 (~6%).
- **Gap to 1.5°C:** ~42% emissions cut needed by 2030 vs ~10% projected.
- **India's per-capita:** ~1.9 t CO₂e vs world average 6.8 t.
- **G20 share:** ~77% of global emissions.

STATE OF CLIMATE 2024 & GLOBAL CLIMATE RISK INDEX 2025

The WMO's State of Climate 2024 report documented record heat, ice loss and extremes. Separately, the Global Climate Risk Index (CRI) 2025 (Germanwatch) showed that India improved its rank to 15th – indicating reduced relative vulnerability compared to previous years.

News in Brief

- State of Climate 2024: WMO flagship annual report; confirmed 2024 as the first year crossing 1.5°C.
- Reported largest single-year fall in Antarctic sea ice; accelerating glacier mass loss in Himalayas (HKH).

- Ocean acidification and sea-level rise hit new records.
- Global Climate Risk Index (CRI) 2025 is published by Germanwatch (Germany-based think tank).
- CRI ranks countries by climate-related losses (death + damage) weighted by population and GDP.
- India improved to 15th in CRI 2025 (from 7th in earlier editions), reflecting better disaster response and early-warning systems.

Prelims Connect

MAJOR CLIMATE REPORTS IN NEWS

Report	Publisher
State of the Global Climate	WMO (Geneva)
Global Climate Risk Index	Germanwatch
World Meteorological Day theme	WMO annually
Sixth Assessment Report (AR6)	IPCC (2021–23)
State of Climate in Asia	WMO Regional
Global Annual to Decadal Climate Update	WMO

IPCC's AR7 cycle is currently underway; key Synthesis Report expected around 2029. Germanwatch's CRI uses damage-to-GDP and death-per-100k weights.

Prelims Pointers

- **State of Climate 2024:** WMO report – 2024 first full year to cross 1.5°C.
- **Global Climate Risk Index:** Germanwatch publication.
- **India CRI 2025:** rank 15th (improved).
- **IPCC AR6:** completed 2023; AR7 cycle underway.
- **Antarctic sea ice:** largest single-year fall recorded.

IMO NET-ZERO FRAMEWORK & FIRST-EVER SHIPPING CARBON TAX

The International Maritime Organization (IMO) has approved the draft Net-Zero Framework for international shipping. The world's first global carbon tax on a major industry – the Global Shipping Emissions Levy – is set to come into effect in the coming years.

News in Brief

- IMO is the UN specialised agency responsible for regulating international shipping; based in London.
- Net-Zero Framework targets net-zero emissions from international shipping 'by or around 2050'.
- The framework uses a combination of mandatory fuel standards (GHG Fuel Intensity) and an economic mechanism (the carbon levy).
- The shipping emissions levy is the world's first legally binding carbon tax on any global industry.
- Expected levy range: \$100–150 per tonne of CO₂ equivalent, rising over time.
- Revenues will fund a just and equitable transition including support to SIDS and LDCs.

Prelims Connect

IMO CLIMATE MEASURES – QUICK VIEW

Measure	Year/Status
IMO initial GHG Strategy	2018 – 50% cut in shipping GHG by 2050
Revised IMO GHG Strategy	2023 – Net-zero 'by or around 2050'
EEXI / CII (efficiency indices)	Implemented 2023
Net-Zero Framework	Approved 2025
Global Shipping Levy	First-ever binding industry-wide carbon tax

International shipping is responsible for ~3% of global CO₂ emissions. Aviation and shipping have historically been outside the Paris Agreement's national NDCs.

Prelims Pointers

- **IMO:** UN specialised agency for shipping; HQ London.
- **Net-Zero Framework:** approved 2025; target 'by or around 2050'.
- **Global Shipping Levy:** world's first industry-wide carbon tax.
- **Key indices:** EEXI (Energy Efficiency Existing Ship Index), CII (Carbon Intensity Indicator).
- **Shipping share of global CO₂:** ~3%.

BRAZIL'S CLIMATE CHANGE COUNCIL & BLUE NDC CHALLENGE

Brazil has proposed the creation of a new international body – the Climate Change Council – to accelerate global climate action and ensure coordinated implementation. Separately, the Blue Nationally Determined Contributions (NDC) Challenge has been launched by Brazil and France, with Australia and Fiji joining as co-leaders.

News in Brief

- Climate Change Council (proposed by Brazil): a new permanent multilateral body to coordinate climate action, distinct from UNFCCC COP.
- Similar in design to the UN Security Council but for climate – aiming at enforcement, not just negotiation.
- Blue NDC Challenge: a coalition encouraging countries to integrate ocean and coastal climate action into their NDCs.
- Covers blue carbon ecosystems (mangroves, seagrasses, salt marshes), sustainable fisheries and offshore renewables.
- Launched in the run-up to COP30, reinforcing Brazil's 'Forests + Oceans' theme.
- India is considering joining this initiative given its long coastline and blue economy interests.

Prelims Connect

BLUE CARBON ECOSYSTEMS – WHAT ARE THEY?

Ecosystem	Carbon-Sink Role
Mangroves	Store 3–5x more carbon per hectare than tropical rainforests
Seagrass meadows	Global stores estimated at ~20 Gt C; threatened by dredging, pollution
Salt marshes	High productivity; long-term sediment carbon sequestration

Kelp forests	Rapid growth; sequester ~200 Tg C/yr globally
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India's MISHTI scheme (Mangrove Initiative for Shoreline Habitats & Tangible Incomes) is a direct contribution to blue-carbon NDCs.

Prelims Pointers

- **Climate Change Council:** proposed by Brazil — new multilateral body.
- **Blue NDC Challenge:** Brazil + France + Australia + Fiji.
- **Blue carbon:** coastal ecosystems that sequester CO₂.
- **MISHTI:** India's mangrove restoration scheme (Budget 2023-24).
- **Brazil's COP30 theme:** 'Forests + Oceans'.

GLOBAL METHANE TRACKER REPORT 2025

The Global Methane Tracker Report 2025 was released by the International Energy Agency (IEA). It estimates that the energy sector alone is responsible for about one-third of global anthropogenic methane emissions — and efforts to cut them remain off-track.

News in Brief

- **Publisher:** International Energy Agency (IEA), Paris — an OECD-affiliated energy policy body.
- Methane (CH₄) is ~80x more potent than CO₂ over a 20-year horizon in terms of warming.
- Anthropogenic methane comes mainly from: energy (~35%), agriculture (~40%), waste (~20%), others (~5%).
- India is the world's second-largest emitter of agricultural methane after China.
- Global Methane Pledge (launched at COP26, 2021): cut methane emissions by 30% by 2030 (vs 2020); India has NOT joined.
- Mount Fentale (Ethiopia) released large amounts of methane in February 2025 — a natural event recorded by satellites.

Prelims Connect

METHANE — FIVE FAST FACTS

Fact	Detail
Formula	CH ₄
GWP (20-year)	~80x that of CO ₂
Atmospheric lifetime	~12 years
Top sources (anthropogenic)	Agriculture, fossil fuels, waste
Global Methane Pledge	Launched COP26 (2021); 30% cut by 2030

Mount Fentale, a northern Ethiopian volcano, released methane via ground fissures in February 2025 — a reminder that natural methane sources are volatile and hard to monitor.

Prelims Pointers

- **Global Methane Tracker:** annual report by IEA.
- **Methane GWP:** ~80x CO₂ over 20 years.
- **Top sectors:** agriculture (40%), energy (35%), waste (20%).

- **Global Methane Pledge (2021):** 30% cut by 2030 – India NOT a signatory.
- **Mount Fentale:** Feb 2025 methane release (Ethiopia).

PROJECT SEACURE & 'DARKENING OCEANS' PHENOMENON

Project SeaCURE is a UK-based pilot project focused on extracting carbon dioxide (CO₂) directly from seawater – a novel marine carbon dioxide removal (mCDR) technology. Separately, a new study reveals that a significant portion of the world's oceans are darkening.

News in Brief

- Project SeaCURE is one of the first operational marine carbon dioxide removal (mCDR) pilots globally.
- Removes dissolved CO₂ from seawater, enabling oceans to reabsorb more atmospheric CO₂.
- Marine CDR is seen as a potentially scalable complement to land-based CDR like reforestation and BECCS.
- Ocean Darkening: up to 21% of global ocean area has grown significantly darker over the past 20 years – i.e., the 'photic zone' (sunlit surface layer) is shrinking.
- Causes include run-off of sediments and nutrients, algal blooms and climate-driven plankton shifts.
- Implications: reduced primary productivity, disruption to marine food chains and oxygen production.

Prelims Connect

CDR (CARBON DIOXIDE REMOVAL) – METHODS

Type	Examples
Nature-based	Afforestation, mangrove restoration, soil carbon, blue carbon
Technology-based	Direct Air Capture (DAC), BECCS, enhanced rock weathering
Marine CDR (mCDR)	SeaCURE, ocean alkalinity enhancement, seaweed cultivation

The IPCC AR6 stressed that CDR is 'essential' to achieve net-zero by 2050, but warned against over-reliance on speculative, unproven technologies.

Prelims Pointers

- **Project SeaCURE:** UK mCDR pilot – extracts CO₂ from seawater.
- **Marine CDR (mCDR):** emerging class of carbon removal technologies.
- **Ocean darkening:** ~21% of oceans darker over 20 years.
- **BECCS:** Bioenergy with Carbon Capture and Storage.
- **Photic zone:** sunlit surface layer where photosynthesis occurs.

HIM-CONNECT INITIATIVE & MANGROVE RISK INDEX 2025

The Union Ministry of Environment, Forest and Climate Change (MoEFCC) is organising 'Him-CONNECT', a Himalayan climate resilience initiative. Separately, the Mangrove Risk Index 2025, jointly developed by Switzerland and the US, has been published.

News in Brief

- Him-CONNECT targets climate-resilient planning in the Himalayan Region (IHR) – 12 states + 2 UTs.
- Ministry of Environment, Forest and Climate Change (MoEFCC) is the nodal body.
- Aligned with the National Mission for Sustaining the Himalayan Ecosystem (NMSHE) – one of eight missions under the NAPCC.
- Mangrove Risk Index 2025: developed by Switzerland and the US, published April 2025.

- Assesses climate, human and biological threats to mangrove forests globally.
- India has the second-largest mangrove cover in Asia (~4,992 sq km) after Bangladesh.

Prelims Connect

NAPCC – 8 MISSIONS (EIGHT)

#	Mission	Nodal Ministry
1	National Solar Mission (Jawaharlal Nehru)	MNRE
2	National Mission for Enhanced Energy Efficiency	Power
3	National Mission on Sustainable Habitat	Housing & Urban Affairs
4	National Water Mission	Jal Shakti
5	National Mission for Sustaining the Himalayan Ecosystem (NMSHE)	DST
6	National Mission for a Green India (GIM)	MoEFCC
7	National Mission for Sustainable Agriculture	Agriculture
8	National Mission on Strategic Knowledge for Climate Change	DST

NAPCC (National Action Plan on Climate Change) was launched in 2008. All eight missions together form India's domestic climate action framework, complemented by States' Action Plans (SAPCCs).

Prelims Pointers

- **Him-CONNECT:** MoEFCC climate resilience initiative for Himalayas.
- **NMSHE:** National Mission for Sustaining the Himalayan Ecosystem.
- **NAPCC missions:** eight in total (2008).
- **Mangrove Risk Index 2025:** joint Switzerland-US publication.
- **India mangrove cover:** ~4,992 sq km (ISFR 2023).

AMAZONFACE PROJECT & TROPICAL FORESTS FOREVER FACILITY (TFFF)

The AmazonFACE Project is a large-scale experiment in the Brazilian Amazon near Manaus that uses Free-Air CO₂ Enrichment (FACE) to study forest responses to elevated CO₂. Separately, Brazil is leading the Tropical Forests Forever Facility (TFFF) with an initial \$1 billion pledge.

News in Brief

- AmazonFACE is one of the largest ecosystem-scale climate experiments in the world.
- Located near Manaus, Brazil, in old-growth terra firme Amazon forest.
- FACE technology: circular rings of towers release CO₂ around standing forest plots to simulate future atmospheric conditions.
- Tests whether the Amazon will continue to act as a carbon sink under elevated CO₂ (CO₂ fertilization effect).
- TFFF: launched at COP30 Belém; rewards tropical forest countries for standing forests on a 'pay-per-hectare' basis.
- Brazil's initial pledge: \$1 billion; goal to reach \$125 billion in public and private finance.

Prelims Connect

TROPICAL FORESTS FOREVER FACILITY (TFFF) – HOW IT WORKS

Element	Detail
Host	Brazil (COP30 Presidency flagship)
Pledge	\$1 bn seed; aiming for \$125 bn total
Beneficiaries	Tropical-forest countries (Brazil, Indonesia, DRC, India, etc.)
Mechanism	Pays for standing forests on per-hectare basis
Innovation	Different from REDD+; no complex carbon accounting

The Amazon is the world's largest rainforest and stores an estimated 150–200 Gt of carbon. 'Tipping point' concerns suggest part of it may flip to savanna under continued deforestation and climate change.

Prelims Pointers

- **AmazonFACE:** large-scale FACE experiment in Brazilian Amazon.
- **FACE technology:** Free-Air CO₂ Enrichment.
- **TFFF:** Tropical Forests Forever Facility – Brazil COP30 flagship.
- **India eligible:** yes – as a major tropical-forest country.
- **Amazon tipping point:** risk of savanna conversion with further deforestation.

CLIMATE CHANGE – KEY FACTS & TEMPERATURE THRESHOLDS

Years 2023 and 2024 were record warm years, intensifying global concerns about the 1.5°C threshold.

News in Brief

- The 2°C limit originated from a 1970s economic model – it is not a scientifically precise danger line.
- Average global temperature rising at 0.27°C per decade – nearly 50% faster than the 0.2°C/decade rate of the 1990s–2000s.
- Sea levels rising at 4.5 mm/year in the last decade vs. 1.85 mm/year average since 1900.
- World has already warmed by 1.3–1.4°C since pre-industrial era; on track to cross 1.5°C around 2030.
- Greenland meltwater could trigger earlier collapse of AMOC, which keeps European winters mild.
- Ice loss exposes dark water that absorbs more solar radiation – amplifies warming (ice-albedo feedback). Threatens phytoplankton growth, which consumes large amounts of global CO₂.
- State of Wildfires 2024–25 report: 3.7 million sq. km burned – roughly equal to India + Norway. CO₂ emissions were higher despite slightly less burned area than last two decades' average.
- UN agencies estimate half the world's population is already struggling with extreme heat. Worker productivity drops 2–3% for every degree above 20°C.

Prelims Connect

KEY CLIMATE TERMS AT A GLANCE

AMOC	Atlantic Meridional Overturning Circulation – stabilises European climate; at risk from Greenland melt
Ice-Albedo Feedback	Melting ice exposes darker ocean/land that absorbs more solar heat, accelerating warming

Phytoplankton	Produces ~50% of Earth's oxygen; threatened by warming oceans; major CO ₂ consumer
1.5°C Paris Target	Paris Agreement goal; world may cross ~2030 at current trajectory

Prelims Pointers

- **Atlantic Meridional Overturning Circulation – Greenland melt is the key threat.** AMOC:
- **accelerates warming as ice is replaced by dark ocean/land.** Ice-albedo feedback:
- **Annual report tracking global wildfire burned area and CO₂ emissions.** State of Wildfires:

GLACIERS – HKH, SVALBARD, SWITZERLAND & PAMIR-KARAKORAM ANOMALY

News in Brief

- Hindu Kush Himalayas (HKH) including Gangotri Glacier are critical water sources for Indus, Ganga, and Brahmaputra rivers.
- Study using SPHY model + IMDAA dataset (1980–2020): Maximum discharge in July driven by snow melt (64%), glacier melt (21%), rainfall-runoff (11%).
- Despite warming trends, snow melt decreased due to reduction in snow cover area; but rainfall-runoff and base flow increased.
- Svalbard: In 2024, glaciers lost nearly 1% of total ice in just six weeks – comparable to Greenland's annual ice loss rate.
- Switzerland (Rhône Glacier): Healthy glacier generates new ice from snowfall at higher altitudes while melting at lower levels. With rising temperatures, melting reaches higher altitudes, halting ice regeneration.
- Pamir-Karakoram Anomaly: Glaciers in Tajikistan's Pamir Mountains have resisted melting – the Kon-Chukurbashi ice cap has even grown slightly. Possible causes: cold climate; increased agricultural water use in Pakistan creating more water vapour.
- Ice core analysis: Clear ice = warm period (melt-refreeze); low-density layer = packed snow; sulphate ions = volcanic time markers; water isotopes = temperature proxies.

Prelims Pointers

- **High-resolution glacio-hydrological model used for Gangotri discharge study.** SPHY:
- **Indian Monsoon Data Assimilation and Analysis – from India Meteorological Department.** IMDAA:
- **receives precipitation from western disturbances (winter) and monsoon (summer).** Gangotri Glacier:

HEAT WAVES – IMD DEFINITION, INDIA'S EXPOSURE & GLOBAL BEST PRACTICES

News in Brief

- IMD Definition: Heat wave = temperature $\geq 40^{\circ}\text{C}$ in plains or $\geq 30^{\circ}\text{C}$ in hills, with 4.5°C above normal for at least 2 days.
- From 2010–24, heat wave days in India had a 200%+ rise.
- The 2022 heatwave cut wheat yields by ~4.5%; some areas lost up to 15%, causing inflation and a power crisis (peak demand: 207 GW).
- McKinsey projects 2.5%–4.5% of India's GDP may be at risk from heat-related productivity losses by 2030.
- The RBI (2024) warned that extreme heat may cause a 4.5% GDP loss for India.
- India once adapted to heat using mud homes, jaalis, baolis, limestone, and solar-aligned routines.

Prelims Connect

GLOBAL BEST PRACTICES – HEAT ACTION PLANS

Country/City	Heat Action Measure
USA (California, Oregon)	Employers must provide water, shade, rest breaks, and heat safety training
France – Plan Canicule	Enforces hydration, work adjustments, and opens cooling spaces during alerts
Qatar, Australia	Restrict outdoor work during peak heat; require heat risk mitigation by employers
Ahmedabad (India)	Adjusted work hours, shaded rest areas – inspired many Indian city HAPs under NDMA guidance
Odisha	Prohibits outdoor work during peak hours

Prelims Pointers

- **Heat Action Plan** – many Indian cities have HAPs inspired by Ahmedabad, under NDMA guidance. HAP:
- **factors in humidity, solar radiation, and wind** – not just air temperature. 'Feels like' temperature:

GHG EMISSIONS 2024 – INDIA AS THIRD LARGEST EMITTER

News in Brief

- 57,700 MtCO₂e of anthropogenic GHGs emitted in 2024 – highest on record.
- India registered the **LARGEST ABSOLUTE INCREASE** in GHG emissions among all countries compared to the previous year.
- India was the **THIRD LARGEST** overall GHG emitter in 2024 (behind China and USA) in absolute terms.
- India's per capita GHG emissions = 3 tCO₂e/year – less than **HALF** the global average of 6.4 tCO₂e.
- India's per capita emissions grew by 3.7% (2023–24), far higher than the global average increase of 0.04%.
- Methane is 84× more potent than CO₂ over 20 years. Agriculture (livestock + paddy) = ~74% of India's methane. Waste sector = ~15% – fastest growing source.

Prelims Connect

GHG COMPOSITION – GLOBAL 2024

GHG Source	Share of Total Emissions
Fossil CO ₂ – power generation, industry, transport	69%
Methane (CH ₄) – agriculture and waste management	16%
Land use change (deforestation)	8%
Nitrous oxide (N ₂ O)	5%

F-Gases (HFCs, PFCs, SF ₆)	3%
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Prelims Pointers

- **Russia (18) > USA > China > EU > World > Indonesia > India (3 tCO₂e).** Per capita rank (6 largest emitters):
- **was the largest single source of fossil CO₂ emissions globally in 2024.** Power generation:
- **water vapour, CO₂, methane, nitrous oxide, and ozone.** Five most abundant GHGs:

INDIA'S CARBON EMISSIONS & COAL CONUNDRUM

News in Brief

- India is the 3rd largest CO₂ emitter (3.2 billion tonnes) – behind USA (4.9 bt) and China (12 bt) [Global Carbon Project].
- India's per capita emission: 2.2 tonnes/year – 2nd lowest among 20 major economies.
- India's 2025 emissions increase: 1.4% (slower than 4% in 2024), partly due to favourable monsoon and strong growth in renewable energy.
- Remaining carbon budget to limit warming to 1.5°C = 170 billion tonnes CO₂ = about four years at 2025 emission levels.
- India dropped 13 places to 23rd in the Climate Change Performance Index (CCPI) released at COP30 – mainly due to lack of coal phase-out progress.
- Renewables = 50% of installed power capacity but only 20% of electricity generation in 2024. Coal contributed 75% of electricity generation in 2024.
- By 2100, climate change could reduce India's GDP by 3%–10%. A 1 GW increase in coal-fired capacity is linked to a 14% rise in infant mortality near plant sites.

Prelims Connect

CLIMATE CHANGE PERFORMANCE INDEX (CCPI)

Published by	Germanwatch + NewClimate Institute + Climate Action Network (CAN) – published annually
Coverage	63 countries + EU (representing 90%+ of global GHG emissions)
Top 3 positions	Always VACANT – no country is yet on a 1.5°C-compatible path (since inception in 2005)
Scoring weights	GHG Emissions 40% Renewable Energy 20% Energy Use 20% Climate Policy 20%
2025 Rankings	Denmark (4th) > UK (5th) > Morocco (6th) > Chile (7th) > India (23rd) > US (65th)

Prelims Pointers

- **Climate Change Performance Index – India fell 13 places to 23rd at COP30.** CCPI:
- **Coal share in electricity fell from 43.6% to 17.5% (2016–24); renewables now over 60%; committed to phase out all coal by 2040.** Chile's lesson:

GHG EMISSION INTENSITY (GEI) TARGET RULES, 2025

The Centre notified India's FIRST LEGALLY BINDING GHG Emission Intensity (GEI) Target Rules, 2025 under MoEFCC.

News in Brief

- Four high-emission sectors notified: Aluminium, Cement, Chlor-alkali, Pulp & Paper.
- Rules set targets on GHG emissions PER UNIT OF PRODUCT OUTPUT – not absolute caps.
- GEI = tCO₂e per equivalent output or product. Standard unit measuring impact of all GHGs based on warming potential.
- 282 high-emission industrial units must comply with mandatory targets for 2025–26 and 2026–27.
- Rules operationalise India's domestic carbon market under CCTS (Carbon Credit Trading Scheme).
- CPCB will impose environmental compensation for non-compliance. Similar markets: Europe (since 2005), China (since 2021).
- Carbon credits traded through the Indian Carbon Market platform, overseen by Bureau of Energy Efficiency (BEE).

Prelims Pointers

- **India's first legally binding GHG rules; 4 sectors; 282 units must comply.** GEI Target Rules 2025:
- **operationalised under Energy Conservation (Amendment) Act, 2022.** CCTS:
- **traded on Indian Carbon Market platform – overseen by Bureau of Energy Efficiency.** Carbon credits:

CARBON CREDIT TRADING SCHEME (CCTS) & GREEN CREDIT PROGRAMME

News in Brief

- Energy Conservation (Amendment) Act 2022 provided statutory mandate for CCTS, 2023. India updated NDCs in 2023 to highlight domestic carbon market.
- Eight sectors covered (2025–30): Aluminium, Cement, Paper & Pulp, Chlor-alkali, Iron & Steel, Textile, Petrochemicals, Petro Refineries.
- ONE carbon credit = right to emit 1,000 kg of CO₂. Projects like renewable energy can earn credits by proving they've reduced CO₂.
- Carbon market launch planned for early 2026. Biochar expected to play a key role.

Prelims Connect

KEY BODIES – INDIA'S CARBON MARKET

NSC-ICM	National Steering Committee for Indian Carbon Market – co-chaired by Secretaries of MoEFCC and Ministry of Power; has direct oversight
Article 6.2 (Paris)	Facilitates transfer of ITMOs (Internationally Transferred Mitigation Outcomes) between countries to help meet NDCs
Article 6.4 (Paris)	UN Supervisory Body oversees project-based credits; finalised at COP-29 Baku, 2024
IETA	International Emissions Trading Association – non-profit promoting market-based climate solutions

Gold Standard	Certification body ensuring high-quality carbon credits with verified environmental and sustainable development benefits
CCPA – Greenwashing	Central Consumer Protection Authority defines greenwashing as 'any deceptive or misleading practice' concealing or exaggerating environmental claims

Green Credit Programme – New Rules (2025)

- Green credits awarded ONLY AFTER 5 YEARS, based on minimum canopy density of 40% and tree survival.
- Tree plantation credits are NON-TRADABLE and NON-TRANSFERABLE (except between holding company and subsidiaries).
- ONE green credit = one tree older than five years, verified by designated agencies.
- This replaces the earlier benchmark of 1,100 trees per hectare within two years.
- GCP launched by PM in 2023 at UN Climate Conference in Dubai. Eligible activities: tree plantation, water conservation, waste management.

Prelims Pointers

- CCTS builds on existing PAT (Perform, Achieve, Trade) Scheme.
- **National Steering Committee for Indian Carbon Market – co-chaired by MoEFCC and Ministry of Power.**
NSC-ICM:

NATIONAL DESIGNATED AUTHORITY (NDA) FOR CARBON TRADING

News in Brief

- MoEFCC announced establishment of NDA – mandatory requirement under the 2015 Paris Agreement to enable a carbon trading regime in India.
- Finalised under Article 6 of the Paris Agreement, passed at COP-29 in Baku, Azerbaijan (2024).
- NDA Composition: 21-member committee headed by Secretary of Environment Ministry; includes officials from External Affairs, Steel, Renewable Energy, and NITI Aayog.
- Role: Recommends, evaluates, approves, and authorises projects for emission reduction unit trading; modifies list of activities to align with national priorities; authorises use of emission reduction units to meet India's NDC.

Prelims Connect

INDIA'S NDC TARGETS

India's NDC Target	Status
45% reduction in GDP emission intensity by 2030 from 2005 levels	By 2023, India reported 33% reduction (2005–2019) to the UN climate body
50% electric power capacity from non-fossil fuel sources by 2030	Renewables now = 50% of India's installed power capacity
Additional 2.5–3 billion tonnes CO ₂ carbon sink by 2030 through afforestation	India expanded forest/tree cover (2005–21); 2.29 billion tonnes CO ₂ -eq added

NDC 3.0 (New NDCs)	Will outline emission reduction goals up to 2035; India expected to submit after COP30
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Prelims Pointers

- Even if ALL NDCs achieved globally, temperature may still rise by 3°C by 2100 – far above Paris Agreement goals.
- **proposed 90% emission cut by 2040 from 1990 levels (proposed in 2024).** EU Commission:
- **India's new NDCs will outline emission reduction goals up to 2035.** NDC 3.0:

ICJ ADVISORY OPINION ON CLIMATE OBLIGATIONS

The International Court of Justice (ICJ) issued an advisory opinion regarding obligations of countries to reduce anthropogenic GHG emissions and the legal consequences of failure.

News in Brief

- Highlighted obligations of developed countries on climate finance, technology transfer, and capacity building to developing nations.
- Affirmed CBDR&RC (Common But Differentiated Responsibilities and Respective Capabilities) as the core guiding principle – extending its applicability BEYOND climate treaties.
- ICJ reinterpreted Paris Agreement's temperature target: shifted focus from 'well below 2°C' to the 1.5°C goal based on COP decisions.
- ICJ ruled that states have a legal duty to protect the climate system and cannot ignore their responsibilities.
- NDCs: States cannot exercise unfettered discretion – must reflect 'highest possible ambition' and take proactive steps to meet them.
- Finance and technology transfer: Developed countries have a LEGALLY BINDING obligation to provide finance and technology for mitigation and adaptation in developing countries.
- ICJ rejected arguments (including India's) that climate treaties are self-contained.
- Withdrawal from treaties (e.g., USA from Paris Agreement) does NOT exempt climate obligations.
- Relied heavily on IPCC AR6 reports. ICJ did not create a new enforcement framework – enforcement depends on jurisdiction of courts and case-specific circumstances.

Prelims Connect

ICJ vs ICC – QUICK CONTRAST

Feature	ICJ	ICC
Full Form	International Court of Justice	International Criminal Court
Nature	One of six UN principal organs (succeeded PCIJ, created 1922 at Peace Palace, The Hague)	Independent of UN
Jurisdiction	Disputes between states	Investigates individuals for genocide, war crimes, crimes against humanity
Location	The Hague, Netherlands – only UN principal organ NOT in New York City	The Hague, Netherlands

India's Status	Party to ICJ – not signed/ratified Rome Statute	NOT a party. 123 countries are party to ICC. India, China, USA not members
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Prelims Pointers

- succeeded PCIJ created by League of Nations in 1922 at the Peace Palace, The Hague. ICJ:
- can also exercise jurisdiction over cases referred by the UN Security Council. ICC:
- is a party to ICJ but has neither signed nor ratified the Rome Statute (ICC). India:

KYOTO PROTOCOL – QUICK REVISION

Prelims Connect

Finalised / Entered into force	1997 / 2005
Under	UNFCCC – first legal instrument under UNFCCC to operationalise provisions through specific climate actions
Binding targets	Only on Annex-I countries (~40 developed nations); from 1990 baseline levels
Developing countries	No binding targets; encouraged 'nationally appropriate' actions – reflecting CBDR-RC principle
Commitment periods	1st: 2008–2012 2nd: 2012–2020 (Doha Amendment, 2012)
Non-ratifiers / withdrawers	USA never ratified despite being largest emitter; Canada and Japan withdrew from 2nd period
CBDR-RC meaning	Common But Differentiated Responsibilities – bulk of responsibility lies with developed countries due to 150 years of historical GHG emissions
Article 17	Countries with spare emission units could sell excess capacity to countries above their targets

Prelims Pointers

- first legal instrument under UNFCCC – finalised 1997, entered into force 2005. Kyoto Protocol:
- ~40 developed nations; had to reduce GHG emissions from 1990 baseline levels. Annex-I countries:

BIOCHAR – INDIA'S CARBON MARKET & AGRICULTURAL ROLE

India will launch its carbon market in 2026, where biochar – a carbon-rich material made from agricultural residue and organic waste – is expected to play a key role in CO₂ removal and sustainable development.

News in Brief

- India generates 600 MMT of agricultural residue and 60 MMT of municipal solid waste annually, much of it burnt or dumped.
- Using 30–50% of surplus waste → 15–26 MMT biochar, removing 0.1 GT CO₂-eq annually.

- Carbon storage: Stores carbon in soil for 100–1,000 years.
- Agriculture: Improves water retention; abates 30–50% NO_x emissions (NO_x has 273× warming potential of CO₂); restores soils; reduces fertiliser use; increases crop yields.
- Construction: Adding 2–5% biochar to concrete improves strength, heat resistance (+20%), captures 115 kg CO₂/m³.
- Water treatment: 1 kg biochar treats 200–500 litres of water.
- By-products: Syngas (20–30 MMT) → 8–13 TWh electricity; bio-oil (24–40 MMT) → offset 12–19 MMT diesel/kerosene.

UK-CBAM & ICM-CBAM LINKAGE — CARBON BORDER TAXES

News in Brief

- UK-CBAM (Carbon Border Adjustment Mechanism): covers direct and indirect emissions in steel, aluminium, electricity production. Starts January 2027.
- Indian exports to UK will face carbon price adjustments matching UK's carbon price (~\$66/tCO₂). Indian carbon price projected at only \$8–10/tCO₂.
- Despite FTA duty reductions, CBAM will increase costs for Indian exports by 20–40% from 2027.
- ICM-CBAM Linkage: EU and India unveiled New Strategic EU-India Agenda. Key proposal: Link Indian Carbon Market (ICM) with EU CBAM — carbon prices paid in India to be deducted from CBAM levies, preventing double penalties for Indian exporters.
- EU ETS: €60–€80/tonne vs India: €5–€10/tonne — wide gap limits how much the EU will credit Indian exporters.
- India consistently opposed CBAM — described by industry as a 'non-tariff barrier' inconsistent with WTO principles.

Prelims Pointers

- **Carbon Border Adjustment Mechanism** — EU tool to prevent 'carbon leakage' from countries with lower carbon prices. CBAM:
- **European Union Emissions Trading System** — world's largest carbon market, operating since 2005. EU ETS:

POLLUTION, WASTE & ENVIRONMENTAL HEALTH

AIR QUALITY INDEX OF INDIAN CITIES — 2025 UPDATE

The Central Pollution Control Board (CPCB) released the latest Air Quality Index (AQI) ranking of Indian cities in 2025. Hanoi topped the 'most polluted city' list while New Delhi still held a top-5 position. AQI is also central to the Commission for Air Quality Management (CAQM)'s recent sweeping ban on non-BS-VI vehicles.

News in Brief

- National Air Quality Index (NAQI) launched by CPCB in 2014 under the 'One Number, One Color, One Description' approach.
- Uses 8 pollutants: PM₁₀, PM_{2.5}, NO₂, SO₂, CO, O₃, NH₃, Pb.
- Six AQI categories: Good (0–50), Satisfactory (51–100), Moderate (101–200), Poor (201–300), Very Poor (301–400), Severe (401–500).
- Hanoi (Vietnam) ranked 2nd most polluted city; New Delhi remains in top-5.
- Commission for Air Quality Management (CAQM) for NCR was constituted in 2021 by a dedicated Act.

- CAQM's new ban: Non-BS-VI fossil-fuel vehicles prohibited from entering Delhi-NCR.

Prelims Connect

INDIA'S AIR QUALITY GOVERNANCE ARCHITECTURE

Body / Instrument	Role
Central Pollution Control Board (CPCB)	National regulator under Air Act 1981 & EPA 1986
State Pollution Control Boards	Implement at state level
CAQM for NCR	Constituted by CAQM Act 2021 – replaced EPCA
National Clean Air Programme (NCAP)	Launched 2019; 131 cities covered
Graded Response Action Plan (GRAP)	Emergency response for NCR
National Air Quality Index (NAQI)	Public-facing dashboard (CPCB)

NCAP's revised target (2026): reduce PM concentrations by 40% in 131 non-attainment cities from 2017 base. CAQM Act 2021 empowers fines up to ₹1 crore and imprisonment up to 5 years for violations.

Prelims Pointers

- **NAQI pollutants:** PM₁₀, PM_{2.5}, NO₂, SO₂, CO, O₃, NH₃, Pb.
- **CPCB:** statutory body under Water Act 1974 + Air Act 1981.
- **CAQM for NCR:** constituted by 2021 Act, replaced EPCA (1998).
- **NCAP:** launched 2019 – 131 non-attainment cities.
- **GRAP:** Graded Response Action Plan for Delhi-NCR emergency.

WORLD AIR QUALITY REPORT 2024 & AQLI – INDIA'S POLLUTION BURDEN

The World Air Quality Report 2024 was released by IQAir. India has been ranked 5th (improving from 3rd). The Air Quality Life Index (AQLI) Report 2025, published by the University of Chicago, identified South Asia as the world's most polluted region. WHO also hosted the 2nd Global Conference on Air Pollution and Health in Cartagena, Colombia.

News in Brief

- IQAir is a Swiss air quality technology company; its annual World Air Quality Report uses ground + satellite data.
- India rank in 2024: 5th most polluted country (down from 3rd in 2023).
- AQLI: developed by the Energy Policy Institute at the University of Chicago (EPIC).
- AQLI converts PM_{2.5} exposure into lost years of life expectancy.
- Indian residents lose, on average, 5.3 years of life expectancy due to air pollution (AQLI 2025).
- 2nd Global Conference on Air Pollution & Health: WHO hosted it in Cartagena, Colombia; adopted a 'Global Road Map on Air Pollution and Health 2025–2040'.

Prelims Connect

KEY AIR QUALITY TRACKER REPORTS

Report	Publisher	Metric

World Air Quality Report	IQAir (Switzerland)	Annual PM _{2.5} by country/city
AQLI Report	EPIC, Univ. of Chicago	Life-years lost per person
State of Global Air	HEI + IHME	Mortality attributable to air pollution
WHO Global Air Quality Guidelines	WHO	Recommended PM _{2.5} limit: 5 µg/m ³

WHO's 2021 revised Air Quality Guideline for PM_{2.5} is 5 µg/m³ (annual mean) – most Indian cities exceed this 5-10 fold.

Prelims Pointers

- **India in World Air Quality Report 2024:** 5th most polluted.
- **AQLI:** EPIC, Univ. of Chicago – life-years lost due to air pollution.
- **India life-years lost:** 5.3 years (AQLI 2025).
- **WHO PM_{2.5} guideline:** 5 µg/m³ annual.
- **2nd Global Conference on Air Pollution & Health:** Cartagena, Colombia (2025).

HIGH FAECAL COLIFORM IN GANGA – CPCB FLAGS ALARM

The Central Pollution Control Board (CPCB) reports indicate alarmingly high levels of faecal coliform in the Ganga – a serious marker of untreated sewage discharge and human health risk.

News in Brief

- Faecal coliform is a microbial indicator of contamination from human or animal waste – measured in MPN/100 ml.
- CPCB permissible limit for bathing water: 2,500 MPN/100 ml; desirable: 500 MPN/100 ml.
- Several Ganga monitoring stations showed readings several multiples above the limit.
- Major contributors: untreated municipal sewage from cities like Kanpur, Varanasi, Patna.
- India's National Mission for Clean Ganga (NMCG) implements Namami Gange – a flagship river rejuvenation programme.
- Kerala HC separately directed Kerala to constitute a specialised Ashtamudi Wetland Monitoring committee.

Prelims Connect

WATER QUALITY PARAMETERS – CPCB CATEGORIES

Class	Use	DO min	BOD max	FC max (MPN/100ml)
A	Drinking without treatment (after disinfection)	6	2	50
B	Outdoor bathing	5	3	500
C	Drinking after conventional treatment	4	3	5,000
D	Propagation of wildlife & fisheries	4	–	–

E	Irrigation, industrial cooling	—	—	—
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DO = Dissolved Oxygen; BOD = Biochemical Oxygen Demand; FC = Faecal Coliform. India follows a 5-class designated-best-use classification under CPCB.

Prelims Pointers

- **Faecal coliform:** indicator of sewage / faecal contamination.
- **CPCB limit (bathing water):** 2,500 MPN/100 ml.
- **Namami Gange:** launched 2014; extended to 2026.
- **NMCG:** National Mission for Clean Ganga – authority under EPA 1986.
- **DO/BOD/FC:** key water quality indicators.

NURDLES – THE PLASTIC LENTILS POLLUTING OCEANS

Nurdles – small plastic pellets about the size of a lentil – have come into sharp focus as one of the top three sources of microplastic pollution in oceans. Separately, Thailand has stopped importing plastic waste from January 2025.

News in Brief

- Nurdles are the raw feedstock used to manufacture almost all plastic products – they are melted down in factories.
- Millions of tonnes of nurdles are spilled into oceans annually during shipping and industrial accidents.
- X Press Pearl disaster (2021, Sri Lanka): the worst nurdle spill in history – over 1,680 tonnes of pellets.
- Thailand plastic ban: effective January 2025; halts imports to stem toxic plastic pollution.
- Other countries (Vietnam, Malaysia, Indonesia) have tightened or banned plastic waste imports post-China's 2018 'National Sword' policy.
- India's Plastic Waste Management Rules (2016, amended 2021) ban identified single-use plastic items and institute EPR for producers.

Prelims Connect

GLOBAL PLASTICS REGIME – KEY MILESTONES

Year	Event
2018	China's 'National Sword' policy bans plastic waste imports
2022 UNEA-5.2	Resolution to negotiate a Global Plastics Treaty by 2024
2023–24	INC-1 to INC-5 negotiations (Uruguay → Busan)
Dec 2024	INC-5.1 in Busan – failed to conclude
Aug 2025	INC-5.2 in Geneva – continued negotiations
2025	Thailand halts plastic waste imports

The UN Plastic Treaty (once finalised) will be the first legally binding global instrument on the full lifecycle of plastics – from production to disposal.

Prelims Pointers

- **Nurdles:** plastic feedstock pellets – major microplastic source.

- **X Press Pearl:** 2021 Sri Lankan turtle disaster (1,680 tonnes).
- **Thailand plastic ban:** imports halted 1 January 2025.
- **Global Plastics Treaty:** UNEA-5.2 mandate (2022).
- **India EPR rules:** Plastic Waste Management (Amendment) Rules, 2022.

SAMUDRA PRATAP POLLUTION CONTROL VESSEL & ICG-JCG JOINT HNS EXERCISE

The Indian Coast Guard (ICG) inducted Samudra Pratap – the first in-built Pollution Control Vessel (PCV). Separately, the Indian Coast Guard and the Japan Coast Guard conducted a joint exercise on Hazardous and Noxious Substances (HNS) response.

News in Brief

- Samudra Pratap is the first Pollution Control Vessel (PCV) built entirely in India.
- It is designed to respond to oil spills in Indian waters.
- Manufacturer: Goa Shipyard Limited (GSL).
- Indian Coast Guard (ICG) was established in 1978 under the Coast Guard Act; it functions as the nodal agency for marine pollution response in Indian waters.
- ICG-JCG joint HNS exercise: strengthens coordination for hazardous chemical spill response.
- HNS Convention 2010 – adopted under IMO – regulates liability and compensation for HNS spills at sea.

Prelims Connect

INDIA'S MARINE POLLUTION RESPONSE ARCHITECTURE

Element	Detail
Nodal agency	Indian Coast Guard (ICG)
Key law	Merchant Shipping Act 1958; Marine Pollution Rules
International Convention	MARPOL 73/78 (India is a party)
National Oil Spill Disaster Contingency Plan	NOSDCP, approved 1996; updated
Latest asset	Samudra Pratap – first indigenous PCV

MARPOL 73/78 is the primary international instrument for prevention of pollution from ships. India is also party to the International Convention on Oil Pollution Preparedness, Response and Co-operation (OPRC 1990).

Prelims Pointers

- **Samudra Pratap:** first in-built Pollution Control Vessel of India.
- **Builder:** Goa Shipyard Limited (GSL).
- **ICG Act:** 1978; ICG is India's 4th armed service.
- **HNS:** Hazardous and Noxious Substances.
- **MARPOL 73/78:** IMO convention on ship-source pollution.

NEW GLOBAL SCIENCE-POLICY PANEL ON CHEMICALS, WASTE & POLLUTION

A new global science-policy panel on chemicals, waste, and pollution has been established by UN countries – modelled on the IPCC and IPBES. Its role is to provide independent scientific guidance for sound chemical and waste management.

News in Brief

- Full name: Intergovernmental Science-Policy Panel on Chemicals, Waste and Pollution Prevention.
- Mandated at UNEA-5.2 (Nairobi, 2022) and operationalised from 2024 onwards.
- Secretariat hosted by UNEP in Geneva.
- Joins IPCC (climate) and IPBES (biodiversity) as the 'third sibling' in the science-policy arena.
- Focus areas: heavy metals, POPs, pesticides, endocrine disruptors, plastics, air pollution.
- India plays an active role via its Chemicals & Petrochemicals Ministry and MoEFCC.

Prelims Connect

THE 'THREE SIBLINGS' OF ENVIRONMENT SCIENCE-POLICY

Body	Year	Mandate
IPCC	1988	Climate change science; AR7 cycle ongoing
IPBES	2012	Biodiversity & ecosystem services
Chemicals Panel (new)	2024	Chemicals, waste & pollution prevention

IPCC and IPBES have Nobel-level credibility; the new chemicals panel is intended to bring similar scientific authority to the domains of chemicals, pollution and hazardous waste.

Prelims Pointers

- **New panel:** Intergovernmental Science-Policy Panel on Chemicals, Waste & Pollution Prevention.
- **Mandate origin:** UNEA-5.2 (Nairobi, 2022).
- **Operational:** 2024; Secretariat at UNEP, Geneva.
- **Sister bodies:** IPCC (1988), IPBES (2012).
- **Key topics:** POPs, heavy metals, plastics, pesticides.

HIMALAYAN CLEANUP 2024 REPORT & SENNA SPECTABILIS MENACE

The Himalayan Cleanup (THC) 2024 Report was jointly released by Zero Waste Himalaya (ZWH) and Integrated Mountain Initiative (IMI). Separately, the rapid spread of invasive *Senna spectabilis* – introduced from South America in southern Indian forests – is threatening native biodiversity.

News in Brief

- Himalayan Cleanup 2024: annual citizen-science initiative documenting plastic waste across Himalayan states.
- Zero Waste Himalaya (ZWH) is a regional NGO network focused on waste and plastic pollution.
- Integrated Mountain Initiative (IMI) is a civil society platform for Indian Himalayan Region issues.
- *Senna spectabilis*: an invasive tree native to Central and South America, introduced for ornamental purposes.
- Has spread aggressively in the Mudumalai-Bandipur-Nagarhole landscape, crowding out native flora.
- Invasive Alien Species are one of the 5 direct drivers of biodiversity loss recognised by IPBES.

Prelims Connect

INVASIVE ALIEN SPECIES OF CONCERN IN INDIA

Species	Type	Area affected
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Lantana camara	Plant (shrub)	All India forests
Prosopis juliflora	Plant (tree)	Semi-arid; Rajasthan, TN, Karnataka
Parthenium hysterophorus	Plant (weed)	All India – 'congress grass'
Senna spectabilis	Plant (tree)	Nilgiris, Wayanad, Bandipur
African catfish	Fish	Many river systems
Water hyacinth	Plant (aquatic)	Lakes and wetlands nationwide

The 2023 GBF (Global Biodiversity Framework) Target 6 specifically calls for reducing the rate of invasive alien species introduction and establishment by 50% by 2030.

Prelims Pointers

- **Senna spectabilis:** invasive tree from South America, major threat in Nilgiris–Wayanad.
- **Himalayan Cleanup (THC) 2024:** ZWH + IMI annual plastic survey.
- **IPBES drivers of biodiversity loss:** habitat change, overexploitation, climate change, pollution, invasive alien species.
- **GBF Target 6:** reduce invasive species introduction rate by 50% by 2030.
- **Other IAS in India:** Lantana, Prosopis, Parthenium, water hyacinth.

NBWL OIL-GAS CLEARANCE & GUNERI – INDIA'S UNIQUE INLAND MANGROVE

The Standing Committee of the National Board for Wildlife (NBWL) approved oil and gas exploratory drilling inside some wildlife protected areas – triggering concerns from conservationists. Separately, 32.78 hectare area of Guneri village in Lakhtar tehsil of Kutch district has been notified – it is a natural inland mangrove.

News in Brief

- NBWL Standing Committee: a statutory body under the WPA 1972, chaired by the Minister of Environment.
- Its clearance is required before any non-forestry activity in wildlife sanctuaries or national parks.
- Recent approvals for oil/gas exploration in sensitive protected landscapes have drawn public criticism.
- Guneri (Kutch): a 32.78 hectare patch notified for protection – a rare naturally-occurring inland mangrove.
- Inland mangroves are extremely rare; exist because of historical sea-level changes or saline aquifers.
- Only a handful of such inland mangrove sites exist globally – Kutch being one.

Prelims Connect

NBWL – KEY FACTS

Attribute	Detail
Parent Act	Wildlife (Protection) Act 1972 (Sec 5A & 5B)
Chairperson	Prime Minister
Vice-Chairperson	Union Minister of Environment
Standing Committee	Clears projects inside PAs; chaired by MoEFCC Minister

Total members	47 (15 institutional; 10 ex-officio; 19 non-governmental experts + others)
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The Supreme Court has ruled that NBWL Standing Committee approvals must be rational, time-bound and reviewed – it cannot rubber-stamp projects.

Prelims Pointers

- **NBWL:** statutory body under Section 5A of WPA 1972.
- **NBWL Chairperson:** Prime Minister.
- **Standing Committee Chair:** Union Environment Minister.
- **Guneri (Kutch):** rare natural inland mangrove, 32.78 ha.
- **Inland mangroves:** globally rare; only a handful of sites.

INDIA'S LIFE EXPECTANCY – FIRST FALL IN 50 YEARS

Expectation of life at birth for India has dropped for the first time in 50 years, registering a decline – a worrying demographic signal linked to air pollution, heat stress and the after-effects of the pandemic.

News in Brief

- India's previous life expectancy trend: 58.7 years (1990) → 70.2 years (2019) – a consistent rise.
- The recent fall is small but historically significant as the first decline in half a century.
- Attributing factors: chronic air pollution, extreme heat events, post-COVID-19 mortality, and rising non-communicable diseases.
- The Global Burden of Disease study estimates 1.6 million deaths per year in India due to air pollution.
- Average Indian loses 5.3 years of life expectancy to air pollution alone (AQLI 2025).
- WHO's Ambient Air Quality database links long-term PM_{2.5} exposure to COPD, heart disease, stroke and lung cancer.

Prelims Connect

INDIA'S LIFE EXPECTANCY TRAJECTORY

Year	Life Expectancy at Birth
1960	45.2
1980	54.5
2000	62.6
2019	70.2
2021-22	~69.8 (post-COVID)
2024	First recorded decline

Despite recent setbacks, India's life expectancy has more than doubled since Independence (in 1947, it was ~32 years).

Prelims Pointers

- **Trend:** India's life expectancy fell for the first time in 50 years.
- **Air pollution deaths:** ~1.6 million per year (GBD study).
- **AQLI 2025:** 5.3 years lost per Indian to PM_{2.5}.

- **1947 baseline:** ~32 years; now ~70 years.
- **Causes:** pollution, heat, NCDs, COVID aftermath.

SWACHH VAYU SARVEKSHAN AWARDS 2025 & WETLAND CITIES CEREMONY

The Swachh Vayu Sarvekshan Awards & Wetland Cities Recognition Ceremony 2025 was organised by the Ministry of Environment, Forest and Climate Change – recognising cities with improved air quality under the National Clean Air Programme (NCAP).

News in Brief

- Swachh Vayu Sarvekshan is an annual ranking of cities under NCAP – launched in 2023.
- Part of NCAP's target of 40% PM reduction by 2026 in 131 non-attainment cities.
- Cities are ranked across three population categories: >10 lakh, 3–10 lakh, <3 lakh.
- Winners are rewarded with additional funding and city-to-city learning exchanges.
- The ceremony also conferred formal Wetland City accreditation on Udaipur and Indore (Ramsar-scheme).
- MoEFCC uses the PRANA (Portal for Regulation of Air-Pollution in Non-Attainment cities) platform for NCAP monitoring.

Prelims Connect

NCAP – NATIONAL CLEAN AIR PROGRAMME

Attribute	Detail
Launched	January 2019
Target (revised)	40% reduction in PM ₁₀ / PM _{2.5} by 2026 (base 2017)
Coverage	131 non-attainment cities across 24 states/UTs
Monitoring Portal	PRANA (CPCB)
Funding channel	XV Finance Commission + direct MoEFCC allocation

Non-attainment cities are those that have not met the National Ambient Air Quality Standards (NAAQS) for 5 consecutive years.

Prelims Pointers

- **Swachh Vayu Sarvekshan:** annual NCAP city rankings.
- **NCAP launched:** January 2019.
- **Revised target:** 40% PM reduction by 2026 (base 2017).
- **Cities covered:** 131 non-attainment cities.
- **PRANA:** NCAP monitoring portal by CPCB.

FLUE GAS DESULPHURISATION (FGD) – MANDATE SCRAPPED?

A high-powered committee led by PSA Ajay Sood recommended scrapping the policy mandating FGD units in most coal-fired thermal power plants (TPPs). FGDs reduce SO₂ emissions, but 92% of India's 600 TPPs have not installed them yet.

News in Brief

- Indian coal is LOW IN SULPHUR (0.2%–0.7%) compared to imported coal (0.5%–1.5%).

- Recommendation would exempt about 80% of TPPs from installing FGDs.

CATEGORY-WISE CLASSIFICATION OF TPPS

Category	% of TPPs	Description & Requirement
Category A	11%	Within 10 km of NCR or cities with >1 million population – MUST mandatorily install FGD systems
Category B	11%	Near Critically Polluted Areas (CPA) or Non-Attainment Cities (NAC) – may or may not have to install FGD
Category C	78%	Neither near Delhi-NCR nor near critically polluted areas – now EXEMPT from installing FGDs

Prelims Connect

- Three types of FGD systems: Dry sorbent injection (powdered limestone) | Wet limestone treatment (slurry → gypsum, widely used in construction) | Seawater scrubbing (coastal plants).
- Flue gas from burning fossil fuels contains: CO₂, SO₂, nitrogen oxides, and particulate matter.
- Sulphate aerosols can offset global warming marginally but WORSEN air quality.

Why Controlling SO₂ Matters

- SO₂ contributes to PM_{2.5}, acid smog, acid rain, and secondary aerosols.
- At 11.2 million tonnes, India is the BIGGEST SO₂ EMITTER globally.
- 15% of India's ambient PM_{2.5} is due to coal; 80% of that from secondary particulate matter from SO₂.
- Coal contains 0.5–6% sulphur (organic and inorganic); inorganic sulphur (iron pyrites, FeS₂) can be partially removed through washing.

Prelims Pointers

- **Flue Gas Desulphurisation – units using basic compounds to neutralise acidic SO₂ gas.** FGD:
- **sets annual average SO₂ limit of 50 µg/m³ for residential/industrial areas.** Air Act 1981:
- **SO₂ is listed as a criteria pollutant under Clean Air Act.** US:

SECONDARY POLLUTANTS – AMMONIUM SULPHATE & PM_{2.5} BURDEN

News in Brief

- Secondary pollutants – particularly ammonium sulphate (from SO₂ + NH₃ reaction) – are responsible for nearly one-third of India's PM_{2.5} pollution.
- Primary pollutants: from burning fossil fuels in automobiles, coal plants, organic matter. React with each other or gases/water vapour → secondary pollutants.
- More than 60% of India's SO₂ emissions originate from coal-fired TPPs.
- Secondary particulate matter contributes up to 42% of India's PM_{2.5} burden.
- Ammonium sulphate concentrations are 2.5× higher within 10 km of coal-fired power plants.
- Ammonium nitrate (another secondary pollutant) contributes up to 50% of PM_{2.5} mass.
- India's annual average PM_{2.5} Concentration = 54.4 µg/m³ (3rd most globally). WHO guideline: 5 µg/m³; India's standard: 40 µg/m³.
- People in 60% of India's districts exposed to polluted air all through the year. Not a single district within WHO guideline.

Prelims Pointers

- **Convention on Long-Range Trans-boundary Air Pollution – 51 parties and 8 protocols.** CLRTAP (1979):
- **amended in 2012 to include PM2.5 as a pollutant.** Gothenburg Protocol to CLRTAP:
- **Diesel Particulate Matter – mostly less than 1 micron; sub-category of PM2.5.** DPM:

DRUM – DYNAMIC ROUTE PLANNING FOR URBAN GREEN MOBILITY (IIT-KHARAGPUR)

News in Brief

- Ambient air pollution causes 7.2% of deaths annually in major Indian cities. PM may reduce life expectancy by up to 5 years.
- Traffic-related pollution accounts for 33% of daily exposure despite commuting comprising only 8% of daily time.
- DRUM (IIT-Kharagpur) provides 5 route options: Shortest | Fastest | Least Air Pollution Exposure | Least Energy Consumption | Suggested Route (balances all four factors).
- Uses GraphHopper (Java routing library) and Mapbox for real-time traffic and air data.
- DRUM 2.0: will use ML models (LSTM, Prophet) to suggest optimal departure times – evolving into a smart mobility assistant.

Prelims Pointers

- **Dynamic Route Planning for Urban Green Mobility – developed by IIT-Kharagpur.** DRUM:
- **open-source Java routing library used in DRUM for route generation.** GraphHopper:

PARALI PROTECTION FORCE & STUBBLE BURNING SOLUTIONS

News in Brief

- CAQM directed Punjab, Haryana, and Uttar Pradesh to establish 'Parali Protection Force' at district and block levels, comprising police officers, agricultural officers, and other officials.
- Punjab: 70% fewer farm fires in 2024 vs 2023 – but total area scorched EXPANDED year-on-year (data discrepancy: farmers may burn after satellites pass over).
- Farm fires recorded daily; burnt area measured by satellites weekly (Sentinel satellite, Meteosat-8/-9 geostationary satellites providing data every 15 minutes).
- Punjab and Haryana: 90% reduction in stubble burning incidents in 2025 compared to 2021.
- India's official estimates use NASA's MODIS (Terra and Aqua) and VIIRS (Suomi-NPP) satellites – polar-orbiting, observing India only between 10:30 AM and 1:30 PM.

Prelims Connect

- **tractor-mounted machine allowing wheat sowing into standing paddy stubble without clearing or burning.** Government provides 50–80% subsidy under CRM (Crop Residue Management) Scheme. Happy Seeders:
- **microbial consortia (fungi/bacteria) that turn hard straw into soft mulch in 20–25 days; available in capsule or liquid form mixed with jaggery and chickpea flour.** Pusa Bio-Decomposer (ICAR-IARI):

Prelims Pointers

- **Commission for Air Quality Management in NCR and Adjoining Areas – set up under CAQM Act, 2021; replaced Environmental Pollution (Prevention & Control) Authority.** CAQM:
- Delhi recorded its lowest January–November average AQI since 2018 (excl. COVID-2020 lockdown year).

AIR QUALITY LIFE INDEX (AQLI) 2025 – INDIA'S POLLUTION BURDEN

News in Brief

- ALL of India lives in areas where annual average PM_{2.5} exceeds WHO limit of 5 µg/m³.
- 46% of India's population lives in areas where national PM_{2.5} standard of 40 µg/m³ has been breached.
- If pollution reduced to WHO safe limit, Delhi would see a LIFE EXPECTANCY INCREASE of 8.2 years. Northern plains particularly affected.
- Bangladesh: most polluted country in South Asia – PM_{2.5} levels 12× higher than WHO guideline.
- China: 2.8% rise in particulate concentration in 2023; but PM_{2.5} levels are 40.8% LOWER than in 2014.
- Global PM_{2.5} concentration in 2023 was 1.5% higher than 2022, and almost five times the WHO limit.
- AQLI calls PM_{2.5} pollution the greatest external threat to life expectancy globally.

Prelims Pointers

- **Air Quality Life Index** – measures how much life expectancy would increase if pollution levels met WHO guideline. AQLI:
- 5 µg/m³. India's national standard: 40 µg/m³ (8× more lenient). WHO PM_{2.5} guideline:

GREEN FIREWORKS – REDUCED EMISSION FIREWORKS (REF)

News in Brief

- SC allowed sale and use of green firecrackers certified by NEERI and PESO during Deepavali.
- Post-Diwali PM_{2.5} spikes reduced from 117% (2021) to 61% (2024).
- Green crackers are two-thirds less noxious. Use zeolite, boron-based water-releasing molecules (dust suppressants).
- Green sparklers: 32% potassium nitrate + 40% aluminium powder + 11% aluminium chips + 17% proprietary additives. PM₁₀ and PM_{2.5} reduced by 30%. Capped at 120 decibels noise.
- Traditional fireworks contain barium nitrate, antimony, heavy metals – linked to respiratory diseases and cancer.
- NEERI's accurate term: 'Reduced Emission Fireworks' (REF) – 'green cracker' is a misnomer (not zero-emission).
- Authentic green crackers identifiable by green logo and QR code on packaging. Manufacturers must hold explosive licence from PESO.

Prelims Pointers

- SC allowed only green firecrackers with reduced emissions; banned online sales. Arjun Gopal v. UoI (2018):
- National Environmental Engineering Research Institute – certifies green firecrackers. NEERI:
- Petroleum and Explosives Safety Organisation – licensing authority. PESO:

CLOUD SEEDING – LIMITATIONS IN DELHI'S POLLUTION FIGHT

News in Brief

- After monsoon withdrawal, dry continental air masses dominate – winds weaken, air becomes stagnant, preventing pollutants from dispersing.
- CLOUD SEEDING DEPENDS ON NATURAL CLOUDS – it CANNOT create clouds. Evidence for cloud seeding reliably increasing rainfall is weak and contested.

- Cloud seeding disperses silver iodide or sodium chloride into clouds to trigger condensation. Silver iodide works because its crystal structure MIMICS ICE, causing droplets to freeze and fall as rain/snow.
- Winter inversion: Cooler air near Earth's surface is denser, trapped under warm air above – forming atmospheric 'lid'. Pollutants lack space to disperse within the vertical mixing layer (planetary boundary layer).
- Repeated use of silver iodide can accumulate in soil and water bodies with poorly understood long-term effects.

Prelims Pointers

- **planetary boundary layer traps pollutants near ground during Delhi winters.** Winter inversion:
- **crystal structure mimics ice – serves as ice nuclei in cloud seeding.** Silver iodide:

GRADED RESPONSE ACTION PLAN (GRAP) & DELHI AIR POLLUTION SOLUTIONS

Prelims Connect

GRAP STAGES – AQI TRIGGERS & KEY ACTIONS

Stage	AQI Range	Key Actions
Stage 1 – Poor	201-300	Mechanised sweeping, water sprinkling on roads, dust mitigation at construction sites, regular solid waste lifting
Stage 2 – Very Poor	301-400	Stop diesel generators (except essentials), no coal/firewood in tandoors, enhance parking fees, augment CNG/electric buses
Stage 3 – Severe	401-450	Ban on construction and demolition, closure of certain industries, school closure mandatory in Delhi and NCR, staggered office timings
Stage 4 – Severe+	>450	State govts can close schools, odd-even vehicle system, stop entry of truck traffic (except essentials), 50% work-from-home for private offices

Delhi Vehicle Emissions Data

- Vehicles emit 47% of PM_{2.5} (road dust: 20%); 78% of NO_x; 49% of NMVOCs.
- 2-wheelers: biggest source of PM_{2.5}, PM₁₀, SO₂, CO. 3-wheelers: lead in VOCs. Buses: largest NO_x source.
- BS-VI vehicles: Mandatory DPFs (diesel particulate filters) cut particulate matter by >90%. Catalytic converters convert CO and NO_x into CO₂, N₂, and water vapour.

Prelims Pointers

- **Commission for Air Quality Management – set up under CAQM Act, 2021; implements GRAP.** CAQM:
- **identified 6 'airsheds' in and around India based on geographical and climatic factors.** World Bank:
- **key tools for addressing stubble burning – a major GRAP trigger.** Happy Seeders and Pusa Decomposer:

CHEMICALLY TOXIC AIR – METAL-CONTAINING FINE PARTICLES (MCFPs)

News in Brief

- PM2.5 levels alone do NOT fully reflect air toxicity – air meeting global standards can still contain harmful particles.
- Researchers focused on Metal-Containing Fine Particles (MCFPs): aluminium, silicon, iron, manganese, lead – make up ~80% of all metal particles in city air.
- Air from 'clean' days ($PM_{2.5} < 15 \mu g/m^3$) was MORE TOXIC to lung cells than on visibly polluted days.
- Culprits: iron-rich MCFPs also carrying manganese and lead – originating from vehicle emissions and coal burning.
- On hazy days, larger mineral particles mask MCFPs; on seemingly clean days, relative concentration of toxic metal particles INCREASES.

Prelims Pointers

- **Metal-Containing Fine Particles – new research shows chemical toxicity can be high even when PM2.5 is low.** MCFPs:
- **chemical toxicity of air cannot be determined from PM2.5 levels alone.** Key finding:

ENHANCED ROCK WEATHERING (ERW) – CARBON MITIGATION TECHNIQUE

News in Brief

- ERW involves spreading crushed rock (basalt) on farmland to accelerate CO_2 capture – mimics natural geological weathering.
- Natural process: carbonic acid (CO_2 dissolves in rainwater) reacts with rocks, locking CO_2 as bicarbonate and limestone.
- Applying 50 tonnes of basalt/hectare/year could capture up to 10.5 tonnes of CO_2 /hectare over 4 years.
- Co-benefits: Enhances soil alkalinity, improves soil fertility and crop yields, neutralises acid runoff.
- Challenge: Carbon capture estimated via cations released during weathering – but cations also form from non-carbonic acids, making measurements uncertain.

GROUNDWATER CONTAMINATION – CGWB ANNUAL REPORT 2024

The 2024 Annual Groundwater Quality Report by the Central Ground Water Board (CGWB) revealed widespread contamination of India's groundwater with nitrates, fluoride, arsenic, uranium, heavy metals, and microbes.

News in Brief

- 85% of rural drinking water and 65% of irrigation water depend on groundwater.
- Contamination due to fertilisers, septic leaks, industrial effluents, and over-extraction (Punjab exceeds 1.5× sustainable limits).

KEY CONTAMINANTS – STATES AFFECTED AND HEALTH IMPACTS

Contaminant	States/Districts Affected	Health Impact
Nitrates – >20% districts; 56% exceed safe levels	Widespread	Blue baby syndrome (methaemoglobinaemia) in infants

Fluoride – 230 districts; 66 million affected	Rajasthan, AP, Telangana worst hit	Fluorosis – bone deformity, dental damage
Arsenic – exceeds WHO limit (10 µg/L)	Punjab, Bihar, UP	Cancers, gangrene, neurological disorders
Uranium – Malwa region	Punjab	Chronic kidney disease and organ damage
Heavy metals – lead, cadmium, chromium, mercury	Industrialised districts	Anaemia, developmental delays, neurological damage
Microbial contamination – sewage infiltration	Urban fringe areas	Cholera, hepatitis A/E, dysentery outbreaks

Prelims Pointers

- **Central Ground Water Board** – subordinate office under Ministry of Jal Shakti; lacks independent statutory powers. CGWB:
- **Central Ground Water Authority** – has statutory powers under EPA, 1986; CGWB is its technical arm. CGWA:
- **scarcely covers groundwater** – significant legislative gap. Water Act 1974:

IMO MEPC-83 – WORLD'S FIRST MANDATORY SHIPPING EMISSIONS LEVY

The IMO approved a Market-Based Measure (MBM) at MEPC-83 (83rd session of the Marine Environment Protection Committee) held in London, to curb shipping emissions.

News in Brief

- Shipping emits ~1 billion tonnes GHG/year = ~2.8% of global emissions. If it were a country, shipping would be the 6th largest emitter. Emissions may increase 50–250% by 2050 without action.
- IMO voted 63–16 in favour of Singapore's hybrid model – making shipping the **FIRST GLOBAL SECTOR** with a mandatory emissions levy framework.
- Final implementation: requires amending MARPOL Annex VI, six-month circulation, and two-thirds vote. Can be blocked if 1/3rd of member states (accounting for 50% of global tonnage) object.

Prelims Connect

IMO FRAMEWORK – TWO PILLARS

Marine Fuel Standard (Technical)	Sets GHG Fuel Intensity (GFI) limit on marine fuels (well-to-wake), forcing shift toward zero/near-zero emission fuels like green hydrogen or ammonia
Global Pricing Mechanism (Economic)	Based on Singapore's Hybrid Model (influenced by India's 'bridging mechanism') – tiered pricing system
Tier 1 Levy	\$100 per tonne CO ₂ -eq for mild non-compliance
Tier 2 Levy	\$380 per tonne CO ₂ -eq for significant non-compliance

India's Proposal	'Bridging mechanism' penalising under-compliant ships and rewarding Zero/Near-Zero fuel users
IMO GHG Targets	Reduce carbon intensity by 40% by 2030 70% by 2040 Net-zero by or around 2050
MARPOL Annex VI	Limits SOx and NOx emissions; includes 'IMO 2020' rule reducing global sulfur cap from 3.5% to 0.5%

Prelims Pointers

- **International Convention for the Prevention of Pollution from Ships (1973/78); adopted by IMO. MARPOL:**
- **I (Oil) | II (Noxious Liquid) | III (Harmful Packaged) | IV (Sewage) | V (Garbage – complete ban on plastic dumping) | VI (Air Pollution).** MARPOL Six Annexes:
- **enforces MARPOL through the Merchant Shipping Act; Coast Guard is nodal agency under National Oil Spill Disaster Contingency Plan (NOS-DCP). India:**

NURDLES – INDIA'S FIRST MAJOR PLASTIC PELLET LANDING (MSC ELSA 3)

News in Brief

- Containers from capsized Liberian-flagged cargo vessel MSC Elsa 3 washed ashore in Kollam and Alappuzha, Kerala – India's FIRST MAJOR PLASTIC PELLET (nurdle) landing due to shipwreck.
- Nurdles (primary microplastics, 1-5 mm diameter): tiny plastic pellets crucial in global plastic supply chain.
- Recovered pellets: LDPE (Low-Density Polyethylene) and HDPE (High-Density Polyethylene). LDPE is difficult to recycle.
- Although not inherently toxic, nurdles contaminate habitats, break down into micro/nano-plastics, and enter food chains.
- Incident classified as Tier 2 maritime event → activated National Oil Spill Disaster Contingency Plan.
- MSC Elsa 3 also carried calcium carbide – reacts with water to produce flammable acetylene gas (exothermic reaction).
- Mercantile Marine Department issued pollution liability warning to MSC under Merchant Shipping Act, 1958.
- Indian Coast Guard Dornier aircraft sprayed dispersants to accelerate biodegradation of oil.

Prelims Pointers

- **primary microplastics (1-5 mm); raw material for plastic manufacturing; classified as marine pollutants.** Nurdles:
- **Low-Density Polyethylene – used in carry bags and films; difficult to recycle.** LDPE:

POLLUTED RIVER SITES – CPCB CLASSIFICATION SYSTEM

News in Brief

- CPCB monitors water quality including rivers, lakes, creeks, drains, and canals.
- BOD > 3 mg/litre = water unfit for bathing. Two continuous locations exceeding criterion in a single river = Polluted River Stretch (PRS).
- Maharashtra had highest PRS (54), followed by Kerala (31), MP (18), Manipur (18).

Prelims Connect

FIVE PRIORITY CATEGORIES OF RIVER WATER QUALITY (CPCB)

Priority	BOD Level (mg/l)	Status
Priority-I	> 30	Critically polluted
Priority-II	20-30	Severely polluted
Priority-III	10-20	Moderately polluted
Priority-IV	6-10	Less polluted
Priority-V	3-6	Non-polluted (still unfit for bathing)

Prelims Pointers

- **primary legislation governing water and river pollution in India.** Water (Prevention and Control of Pollution) Act, 1974:
- **National Water Quality Monitoring Programme – started by CPCB in 1978 under Global Environmental Monitoring System (GEMS).** NWQMP:
- **Biological Oxygen Demand – indicator of organic pollution in water; >3 mg/l = unfit for bathing.** BOD:

BIOREMEDIATION, WATER RECYCLING & CONTAMINATED SITES RULES 2025

Bioremediation

- Bioremediation harnesses microorganisms (bacteria, fungi, algae, plants) to sequester or transform toxic substances (oil, pesticides, plastics, heavy metals).
- In situ: treatment at the contaminated site directly. Ex situ: contaminated soil/water removed, treated, and returned.
- GM microbes designed to degrade tough chemicals like plastics or oil residues. CSIR-NEERI has mandate for bioremediation R&D.

Water Recycling – TTRO & TTUF

TTRO	Tertiary Treatment Reverse Osmosis – multi-stage purification; removes dissolved solids, salts; produces high-purity water for industrial reuse
TTUF	Tertiary Treatment Ultra-Filtration – membranes with 0.01-0.1 micron pores remove colloids, bacteria, organics; can function standalone for lower TDS needs
Application	In commercial buildings, recycled water can meet 60-70% of water requirements
S2S Approach	Source to Sea (Manila Declaration, 2012) – treats Earth as single system; integrates land, freshwater, coastal, and ocean resource management

World Water Day 2025	Theme: Glacier Preservation (March 22). 2025 = International Year of Glaciers' Preservation. Launch of Decade of Action on Cryospheric Science (2025–2034)
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Environment Protection (Contaminated Sites) Rules, 2025

- Notified under EPA 1986 to address chemically contaminated sites – providing a legal structure for handling contamination.
- State Board: preliminary assessment within 90 days → detailed survey within 3 more months → reference organisation specifies remediation plan → State Board has 90 days to identify responsible parties.
- Test against 189 hazardous chemicals listed in Hazardous and Other Wastes Rules, 2016.
- Those found responsible must pay remediation costs; else Centre and State arrange cleanup funding.
- NOT applicable to: Radioactive waste | Mining operations | Marine oil pollution | Solid waste from dump sites.

Prelims Pointers

- **337 tonnes of Union Carbide toxic waste completely incinerated – 40+ years after the 1984 tragedy (MIC gas leak). Methyl Isocyanate (MIC): extremely toxic, colourless liquid; boiling point 39.1°C; highly reactive with water.** Bhopal 2025:
- **governs claims and compensation.** Bhopal Gas Leak Disaster (Processing of Claims) Act, 1985:

GLOBAL PLASTICS TREATY NEGOTIATIONS – INC 5.2 (GENEVA)

Since 2022, UNEP has sought a legally binding treaty to end plastic pollution, including in oceans and on land. Around 180 countries participated in the final round at UN offices in Geneva (INC 5.2). The draft treaty contains 32 Articles requiring consensus.

News in Brief

COUNTRY BLOCS IN THE NEGOTIATIONS

Bloc	Countries	Position
High Ambition Coalition (HAC)	Norway, Rwanda, 80+ countries (EU, Japan, African and Pacific states, Latin America)	Demands plastic production caps and phase-outs
Like-Minded Countries (LMC)	India, Saudi Arabia, Iran, Kuwait, Russia, China, Bahrain, Cuba	Argues for waste management, NOT production cuts
USA	Not part of HAC or LMC	Opposed production cuts despite earlier backing stronger measures

India's Position

- India does NOT treat plastics as a health threat – frames it as a WASTE ISSUE.
- India supports EPR and bans on 20 single-use plastics but enforcement remains weak.
- India opposed Article 6 (Polymer Production Limits) citing right to development.
- Plastic Waste Management Rules 2021 banned 19 categories of SUPs from 2022.

Key Plastic Facts

- Plastic takes over 200 years to decompose. India accounts for 20% of global plastic emissions.
- Global plastic waste production: ~400 MT/year; expected 1,100 MT by 2050.
- Of total plastic waste generated: 9% recycled, 19% incinerated, 50% in landfills, 22% escapes waste management.
- Over 16,000 chemicals in plastics; risks of 10,000+ remain unknown.
- Bisphenols, phthalates, PCB, PBDEs, PFAS linked to thyroid issues, cancers, hypertension, gestational diabetes.
- Microplastics (<5mm) detected in blood, placenta, breast milk, bone marrow.
- UNEP warns: by mid-century, more plastic in ocean than fish at current rate.

Prelims Pointers

- **Intergovernmental Negotiating Committee** – UN body seeking global plastics treaty. INC 5.2:
- **High Ambition Coalition led by Norway and Rwanda; 80+ countries including EU.** HAC:
- **Like-Minded Countries** – India, Saudi Arabia, Iran, Kuwait, Russia, China, Bahrain, Cuba. LMC:

E-WASTE – INDIA'S GROWING CRISIS & MANAGEMENT RULES 2022

India produced 2.2 million tonnes of e-waste in 2025 – 3rd largest globally (China > USA > India). Growing electronic usage has led to a 151% increase in e-waste in six years.

News in Brief

- India loses over ₹80,000 crore worth of critical metals yearly due to inefficient informal recycling methods.
- Social costs exceed \$20 billion: informal recycling by women and children reduces life expectancy to below 27 years.

E-Waste (Management) Rules, 2022

- Replaces 2016 rules. Scope expanded to include solar PV modules/panels and large IT and telecom equipment. Rules now cover 106 types of electrical and electronic equipment (EEE).
- Mandatory EPR regime: producers purchase EPR Certificates from registered recyclers. All transactions on CPCB E-Waste Portal.
- RoHS (Reduction of Hazardous Substances): producers must ensure new equipment doesn't exceed limits for lead, mercury, cadmium.
- EPR Floor Price Mechanism: ensures fair compensation for formal recyclers; curbs hazardous informal practices (currently 95% of sector).
- Only 22–25% of India's e-waste is processed through formal channels.

Repairability Index

- Draft 'Framework on Repairability Index (RI) in Mobile and Electronic Sector' – scores electronics on: availability of spare parts | cost of repair | software updates | access to repair information.
- India launched Right to Repair framework in 2022 and national portal in 2023 (DoCA). UN SDG 12 promotes repair as part of responsible consumption.

Battery Waste

- Battery Waste Management Rules (BWMR) 2022 with EPR – India's EV lithium battery demand may rise to 139 GWh by 2035 (from 4 GWh in 2023).
- Recycling lithium-ion batteries could create a \$3.5 billion industry by 2030. India currently recycles only 1% of end-of-life lithium-ion batteries.

Prelims Pointers

- replaced 2016 rules; 106 EEE categories; mandatory EPR; RoHS compliance. E-waste (Management) Rules 2022:
- 3rd globally (China > USA > India); only 22–25% formally processed. India's e-waste rank:

MICROPLASTICS – SUNDARBANS AMR LINK & GOA ESTUARINE STUDY

Sundarbans – Microplastics & Antimicrobial Resistance

- Microplastics accumulating in Sundarbans at 3 billion particles daily through rivers.
- Microbes developed ability to degrade 17 different plastic polymers by producing Plastic-Degrading Enzymes (PDEs).
- These microbes also carry Antimicrobial Resistance Genes (ARGs) and Metal Resistance Genes (MRGs) – plastic breakdown and AMR are INTERCONNECTED.
- Plastic degradation enzymes more abundant during monsoon (freshwater brings nutrients, bacteria, microplastics).

Goa Estuarine Study

- Higher contamination in benthic (sea-floor) sediments vs. pelagic (open water column).
- Fish exposed to microplastics: disrupted gene expression, oxidative stress, reproductive damage, reduced growth.
- Mandovi-Zuari system accounts for 97% of Goa's total fish output.
- Four major shapes of microplastics: fibres (53%), fragments (29.9%), films (13.1%), beads (4%).

Prelims Pointers

- plastic particles sized 1 micrometre to 5 millimetres – primary (manufactured) or secondary (breakdown of larger plastics). Microplastics:
- Antimicrobial Resistance – ability of microorganisms to resist medicines; interconnected with microplastic pollution in Sundarbans. AMR:
- commissioned project to assess microplastic contamination in food – found in all tested salt and sugar samples. FSSAI:

WASTEWATER SURVEILLANCE – ICMR EXPANSION TO 50 CITIES

News in Brief

- ICMR to launch wastewater surveillance for 10 viruses across 50 cities (up from current 5 cities). Currently only COVID-19 and poliovirus are under surveillance.
- Plan to add pathogens linked to fever, diarrhoea, acute encephalitis, respiratory distress. Early warning systems for outbreaks including avian influenza (AIV).
- WBE (Wastewater-Based Epidemiology): real-time, cost-effective, non-invasive community-level data even from asymptomatic populations. Helps predict future pandemics and identify transmission hotspots.
- AMR surveillance conducted at several hospitals. AMR = ability of bacteria, viruses, fungi, parasites to resist medicines.

Prelims Pointers

- Wastewater-Based Epidemiology – effective early detection tool for disease outbreaks. WBE:
- COVID-19 and poliovirus; expanding to 10 viruses across 50 cities. Current scope:

VAAN ISLAND – DECADE OF ARTIFICIAL REEF RESTORATION PAYS OFF

A decade-long artificial reef restoration of Vaan Island in the Gulf of Mannar has generated socio-ecological benefits and is now showcased as India's most successful coral restoration model.

News in Brief

- Vaan Island is one of 21 uninhabited islands in the Gulf of Mannar Marine National Park, Tamil Nadu.
- The island was eroding rapidly due to coral mining, boat anchoring and climate-induced sea-level rise.
- Suganthi Devadason Marine Research Institute (SDMRI) led a decade-long reef restoration programme.
- Technique: deployment of concrete pyramid modules and cement 'Trapezoidal Artificial Reef' units to stabilize the reef base.
- Result: 300+ coral recruitment in previously degraded patches; rise in fish diversity.
- Gulf of Mannar Marine Biosphere Reserve (1989) was India's first marine biosphere reserve.

Prelims Connect

INDIA'S CORAL REEF AREAS

Location	Reef Type
Gulf of Mannar (TN)	Fringing reefs – 21 islands
Gulf of Kutch (GJ)	Fringing reefs – northernmost reefs in India
Andaman & Nicobar Islands	Fringing + patch reefs (largest diversity)
Lakshadweep Islands	Atoll reefs (only true atolls in India)
Malvan (Maharashtra)	Small patch reefs (marine sanctuary)

India's first National Coral Reef Research Institute (NCRRI) is being established at Chidiyatapu, South Andaman.

Prelims Pointers

- **Vaan Island:** Gulf of Mannar coral restoration model.
- **Agency:** SDMRI (Suganthi Devadason Marine Research Institute).
- **Gulf of Mannar:** India's first Marine Biosphere Reserve (1989).
- **India's coral reef zones:** 4 major areas (Mannar, Kutch, A&N, Lakshadweep).
- **NCRRI:** India's first National Coral Reef Research Institute, Chidiyatapu.

STATUS OF UNGULATES IN TIGER HABITATS – WII REPORT

The 'Status of Ungulates in Tiger Habitats of India' report was released by the Wildlife Institute of India (WII). It is the first-ever scientific estimation of wild ungulate prey base in all of India's tiger landscapes.

News in Brief

- Published by: Wildlife Institute of India (WII), Dehradun – under MoEFCC.
- Covers key ungulate species: sambar, chital (spotted deer), gaur, wild boar, nilgai, barking deer.
- Ungulates are the primary prey base of large carnivores – healthy tiger populations depend on dense ungulate populations.
- Report uses distance-sampling methodology at ~17,000 line transects across 53 tiger-range forest divisions.

- India's tiger density strongly correlates with chital + sambar densities.
- Loss of ungulate prey is the single biggest constraint on tiger recovery in 'Tigers Outside Tiger Reserves' landscapes.

Prelims Connect

WILDLIFE INSTITUTE OF INDIA (WII) – QUICK FACTS

Attribute	Detail
Established	1982
Headquarters	Dehradun, Uttarakhand
Parent Ministry	Environment, Forest and Climate Change (MoEFCC)
Key Programmes	All India Tiger Estimation; Project Snow Leopard; Species Recovery
Publications	Status of Tigers; Status of Leopards; Status of Ungulates

The ungulate density threshold for sustaining a breeding tiger population is around 25 ungulates per sq km, per WII modelling.

Prelims Pointers

- **WII:** Wildlife Institute of India, Dehradun (est. 1982).
- **Ungulate density threshold for tigers:** ~25 per sq km.
- **Key prey species:** chital, sambar, gaur, wild boar.
- **Methodology:** distance sampling at 17,000+ transects.
- **Connection:** underpins Tigers Outside Tiger Reserves (TOTR) project.

INDIA'S FIRST 'WILDLIFE-SAFE' HIGHWAY – NHAI INNOVATION

The National Highways Authority of India (NHAI) launched India's first wildlife-safe highway on a 12 km stretch of the Delhi–Dehradun expressway passing through the Rajaji–Kansrao elephant corridor.

News in Brief

- Wildlife-safe section: 12 km elevated corridor through the Rajaji–Kansrao elephant-tiger corridor.
- Features: wildlife underpasses, overpasses (eco-bridges), fencing to prevent roadkill, speed limits for vehicles.
- The corridor connects Rajaji National Park and Corbett National Park in Uttarakhand.
- First Indian highway officially notified as 'wildlife-safe'.
- Part of NHAI's larger effort to integrate ecological sensitivity into road alignment and design.
- Tiger reserves and protected areas are typically fragmented by national highways and railway lines – this is a step toward mitigation.

Prelims Connect

WILDLIFE CROSSING STRUCTURES – TYPES

Type	Description
Underpass	Culvert-like tunnel under road; for small to medium animals

Overpass / Eco-bridge	Vegetated bridge over road; for large mammals
Viaduct	Long elevated section of road
Amphibian tunnel	Small tube under road for frogs, toads etc.
Canopy bridge	Rope bridges for arboreal species (primates, sloths)

India's NH-44 (Pench corridor) also has nine animal underpasses – a pioneering model; the Delhi-Dehradun section is the first to be formally declared 'wildlife safe'.

Prelims Pointers

- **Wildlife-safe highway:** Delhi-Dehradun expressway, 12 km (Rajaji-Kansrao).
- **Agency:** National Highways Authority of India (NHAI).
- **Connects:** Rajaji NP and Corbett NP.
- **Crossing structures:** underpasses, eco-bridges, fencing.
- **Earlier example:** NH-44 Pench corridor (9 animal underpasses).

CITES COP-20 SAMARKAND & 20TH CITES CONFERENCE

The 20th CITES Conference of Parties (CoP-20) took place in Samarkand, Uzbekistan, marking 50 years of the Convention on International Trade in Endangered Species.

News in Brief

- CITES – Convention on International Trade in Endangered Species of Wild Fauna and Flora.
- Adopted in Washington, 1973; entered into force in 1975; currently 184 Parties.
- India is a party to CITES since 1976.
- CITES is administered via three appendices: Appendix I (no commercial trade), II (regulated trade), III (voluntary listing).
- CoP-20 (2025) held in Samarkand, Uzbekistan – marked the 50th anniversary of the Convention's entry into force.
- Key agenda items: pangolin trade, shark and ray proposals, ivory trade continuation, new plant listings.

Prelims Connect

CITES – 3 APPENDICES

Appendix	Status	Examples
I	Threatened with extinction; trade only in exceptional cases	Tiger, Asian elephant, Rhinos, Pangolin, Sea turtles
II	Not necessarily threatened; trade regulated via permits	Hippopotamus, Great White Shark, Mahogany
III	Protected in at least one country; that country asks others' cooperation	Golden Jackal (India listed), Walrus

India hosted CITES CoP-3 in 1981 – one of the earliest host countries. The CITES Secretariat is located in Geneva, Switzerland.

Prelims Pointers

- **CITES:** Convention on International Trade in Endangered Species.
- **Adopted:** 1973; in force 1975; 184 Parties.
- **CoP-20 venue:** Samarkand, Uzbekistan (2025) – 50th anniversary.
- **India joined:** 1976.
- **Three appendices:** I (no trade), II (regulated), III (voluntary).

TIGERS OUTSIDE TIGER RESERVES PROJECT & CBD COP16

The 'Tigers Outside Tiger Reserves' (TOTR) project is being launched in 17 Indian states to address the growing presence of tigers outside notified protected areas. Separately, CBD COP16 (Rome resumed session) saw major decisions on biodiversity finance and the Global Biodiversity Framework.

News in Brief

- TOTR: a MoEFCC initiative to monitor and protect tigers residing outside the 58 notified Tiger Reserves.
- Nearly 30% of India's tiger population now lives outside tiger reserves – in landscapes shared with people.
- TOTR covers 17 states with confirmed tiger presence outside TRs.
- Key interventions: corridor protection, voluntary village relocation, compensation, anti-poaching.
- CBD COP16 resumed session: held in Rome (February 2025) after the Cali (Colombia) main session of October 2024.
- Agreed on the Cali Fund – the 'Fund for Benefit-Sharing from the use of Digital Sequence Information (DSI)'.

Prelims Connect

KUNMING-MONTREAL GLOBAL BIODIVERSITY FRAMEWORK (GBF) – 4 GOALS + 23 TARGETS

Goal / Target	Highlight
Goal A	Halt and reverse biodiversity loss by 2050
Target 1	Spatial planning; reduce loss of all areas
Target 3 (30x30)	Conserve 30% of land & sea by 2030
Target 6	Reduce invasive species introduction by 50% by 2030
Target 18	Phase out harmful subsidies (\$500 bn/yr)
Target 19	Mobilise \$200 bn/yr for biodiversity by 2030

CBD (Convention on Biological Diversity) was adopted at Rio 1992. Its three objectives: conservation, sustainable use, fair & equitable benefit sharing.

Prelims Pointers

- **TOTR Project:** 17 states; for tigers outside the 58 Tiger Reserves.
- **CBD:** adopted Rio 1992; India is a Party.
- **COP16 resumed:** Rome, Feb 2025 (main session: Cali, Oct 2024).
- **GBF 30x30 target:** protect 30% of land & sea by 2030.
- **Cali Fund:** for Digital Sequence Information (DSI) benefit-sharing.

PROJECT LION, IBCA TREATY STATUS & GLOBAL BIG CAT SUMMIT

The Union Government approved ₹2,900 crore funding for Project Lion. The International Big Cat Alliance (IBCA) has officially become a full-fledged treaty-based intergovernmental organisation. India will also host the inaugural Global Big Cat Summit in 2026.

News in Brief

- Project Lion: approved 2023, budget ₹2,900 crore; covers the entire Asiatic lion landscape in Gujarat.
- International Big Cat Alliance (IBCA): launched by India in April 2023 for conservation of 7 big cats – Tiger, Lion, Leopard, Snow Leopard, Jaguar, Puma, Cheetah.
- IBCA achieved treaty-based status in 2025 after the required 5 countries ratified the framework agreement.
- Headquarters: New Delhi, India.
- First IBCA Assembly held in June 2025; Nepal recently joined as the latest member.
- India to host the Global Big Cat Summit in 2026 – announced at COP30 Belém.

Prelims Connect

THE 'BIG 7' WILD CATS OF IBCA

Species	Scientific Name	IUCN
Tiger	<i>Panthera tigris</i>	Endangered
Lion	<i>Panthera leo</i>	Vulnerable
Leopard	<i>Panthera pardus</i>	Vulnerable
Snow Leopard	<i>Panthera uncia</i>	Vulnerable
Jaguar	<i>Panthera onca</i>	Near Threatened
Puma	<i>Puma concolor</i>	Least Concern
Cheetah	<i>Acinonyx jubatus</i>	Vulnerable

IBCA is the first international alliance dedicated specifically to the conservation of big cat species. India leads the alliance; membership is open to all big-cat-range countries.

Prelims Pointers

- **Project Lion:** launched 2023, budget ₹2,900 crore.
- **IBCA:** International Big Cat Alliance; HQ New Delhi.
- **IBCA species count:** 7 big cats.
- **Treaty status:** achieved 2025.
- **Global Big Cat Summit:** India to host inaugural edition (2026).

FOREST RIGHTS — SOLIGAS OF BRT TIGER RESERVE & KARNATAKA TRIBAL VILLAGE

Prime Minister Modi referred to the Soligas of BRT Tiger Reserve in the 119th edition of Mann Ki Baat, highlighting their exemplary forest rights recognition. Simultaneously, Karnataka's proposal to establish a tribal village within a tiger reserve buffer zone ignited a debate about forest rights vs core-area inviolability.

News in Brief

- The Soligas are a tribal community residing inside the Biligiri Rangaswamy Temple (BRT) Tiger Reserve, Chamarajanagar, Karnataka.

- The Soligas were the first community to receive Community Forest Rights (CFR) inside a tiger reserve (2011 Supreme Court verdict).
- BRT Tiger Reserve was notified in 2011; located at the junction of the Eastern and Western Ghats.
- The Forest Rights Act (FRA) 2006 recognises individual and community rights of forest-dwelling communities.
- Section 4(2) of FRA ensures 'critical wildlife habitats' can be declared only after settlement of rights.
- Recent Karnataka controversy reflects the perennial tension between conservation and tribal rights.

Prelims Connect

FOREST RIGHTS ACT, 2006 – KEY RIGHTS RECOGNISED

Right	Description
Individual Forest Rights (IFR)	Right to hold and live in forest land (max 4 ha)
Community Forest Rights (CFR)	Traditional community use rights
Habitat Rights	For PVTGs over their customary habitats
CFR-Management (Sec 3(1)(i))	Right to protect and manage community forest resource
Development Rights	Access to basic facilities (school, water, road)

The FRA 2006 is enforced by the Ministry of Tribal Affairs. The 2011 Supreme Court verdict on Soliga CFR claims was a landmark decision.

Prelims Pointers

- **Soligas:** tribal community inside BRT Tiger Reserve, Karnataka.
- **First community:** to get CFR inside a tiger reserve (2011).
- **FRA 2006:** enforced by Ministry of Tribal Affairs.
- **IFR limit:** maximum 4 hectares per family.
- **BRT TR:** junction of Eastern & Western Ghats.

HORNBILL CONSERVATION CENTRE & PALAMAU TIGER SAFARI

India's first hornbill conservation centre is being established at Anamalai Tiger Reserve in Tamil Nadu. Jharkhand is establishing its first tiger safari within Palamau Tiger Reserve (PTR).

News in Brief

- Anamalai Tiger Reserve in TN hosts India's second-largest population of Nilgiri tahr and 4 species of hornbills.
- Hornbills are keystone species – 'farmers of the forest' – for dispersing large-seeded rainforest trees.
- India has 9 species of hornbills: Great Indian, Rufous-necked, Narcondam, Indian Grey, Malabar Grey, Malabar Pied, Oriental Pied, Wreathed, and White-throated Brown.
- Narcondam Hornbill is endemic to the tiny Narcondam Island in the Andamans.
- Palamau Tiger Reserve (Jharkhand) is one of India's 9 initially notified tiger reserves under Project Tiger (1973).
- PTR is also the site of India's first tiger census (1932, a colonial precursor).

Prelims Connect

ICONIC HORNBILLS OF INDIA

Species	Range	IUCN
Great Indian Hornbill	Western Ghats, NE India	Vulnerable
Rufous-necked Hornbill	NE India	Vulnerable
Narcondam Hornbill	Narcondam Island only	Endangered
Malabar Pied Hornbill	Western Ghats	Near Threatened
Wreathed Hornbill	NE India	Vulnerable

The Great Indian Hornbill is the state bird of Kerala and Arunachal Pradesh. It lives up to 50 years in the wild.

Prelims Pointers

- **India's first hornbill conservation centre:** Anamalai Tiger Reserve, TN.
- **Great Indian Hornbill:** state bird of Kerala & Arunachal Pradesh.
- **Narcondam Hornbill:** endemic to one tiny island.
- **India hornbill species:** 9.
- **Palamau Tiger Safari:** Jharkhand's first.

WILDLIFE WEEK 2025 – MoEFCC LAUNCHES 5 NATIONAL PROJECTS + VANTARA

During the Wildlife Week (October 2025) celebrations, the MoEFCC launched 5 national-level conservation projects for species recovery. Separately, Prime Minister Narendra Modi inaugurated Vantara – a unique wildlife conservation, rescue and rehabilitation centre in Gujarat.

News in Brief

- The 5 species-focused conservation projects cover: Dolphin, Asian Elephant, Gharial, Great Indian Bustard, and Olive Ridley.
- Part of the expanded 'Species Recovery Programme' for 22 critically endangered species.
- Vantara (meaning 'Star of the Forest') is located in Jamnagar, Gujarat.
- Established by the Reliance Foundation – the world's largest animal rescue and rehabilitation facility.
- Vantara hosts over 200 elephants, 7,000+ other animals rescued from captivity and illegal trade.
- Wildlife Week: celebrated annually from 2–8 October; Wildlife Day on 3 March (UN) and 6 October (India).

Prelims Connect

INDIA'S SPECIES RECOVERY PROGRAMME – SELECTED PROJECTS

Species	Project
Tiger	Project Tiger (1973); NTCA
Asian Elephant	Project Elephant (1992); MIKE programme
One-Horned Rhinoceros	Kaziranga / DNP conservation
Asiatic Lion	Project Lion (2023)
Cheetah	Project Cheetah (2022)

Great Indian Bustard	Recovery programme under WII
Dolphin	Project Dolphin (2020)
Crocodylians	Project Crocodile (1975)
Vulture	Action Plan for Vulture Conservation (2020-25)

Project Dolphin was announced by PM Modi in his 2020 Independence Day speech. It covers both Ganga River Dolphin (Platanista gangetica) and marine dolphins.

Prelims Pointers

- **Wildlife Week:** 2-8 October annually.
- **MoEFCC 5 new projects:** Dolphin, Elephant, Gharial, Bustard, Olive Ridley.
- **Vantara:** Jamnagar; Reliance Foundation rescue centre.
- **Project Dolphin:** announced 2020; covers Ganga + marine dolphins.
- **Project Tiger:** oldest (1973).

GIR NBWL MEETING & HARYANA ARAVALI SAFARI PARK

PM Modi visited Gir National Park in Gujarat and chaired the 7th meeting of the National Board for Wildlife (NBWL). Separately, Haryana's ambitious 3,858 hectare Aravali Safari Park project, spread across Gurugram and Nuh, drew ecological concerns.

News in Brief

- NBWL 7th Meeting held at Gir National Park – the world's only habitat of the Asiatic lion.
- NBWL is a statutory body constituted under Section 5A of the Wildlife (Protection) Act, 1972.
- Chairperson: the Prime Minister; Vice-chairperson: Union Environment Minister.
- Aravali Safari Park: 3,858 hectares across Gurugram & Nuh in Haryana – to be Asia's largest safari park.
- Criticism: ecologists argue the project converts protected Aravalli forest (covered by 'NCR Plan' and Supreme Court's Aravali order) to a tourism zone.
- Aravallis are one of the world's oldest fold mountains and act as a natural barrier against desertification from the Thar.

Prelims Connect

ARAVALIS – WHY IT MATTERS

Feature	Detail
Age	~3.2 billion years – world's oldest fold mountains
Length	~670 km from Delhi to Gujarat
Highest peak	Guru Shikhar, Mt Abu (1,722 m)
Key role	Barrier against Thar desertification; recharges groundwater of NCR
Key species	Leopard, striped hyena, Indian fox, jackal, sloth bear, nilgai

The Supreme Court's 1996 Godavarman case and 2018 Aravali order restrict mining and construction in the Aravali range. The CEC report flags the Haryana Safari Park project.

Prelims Pointers

- **NBWL 7th meeting:** at Gir NP; chaired by PM.
- **NBWL statutory base:** Sec 5A, WPA 1972.
- **Aravali Safari Park:** 3,858 ha in Gurugram + Nuh, Haryana.
- **Aravallis age:** ~3.2 billion years – world's oldest fold mountains.
- **Guru Shikhar:** highest peak (1,722 m, Mt Abu).

INSTITUTIONS, REPORTS & MISSIONS

NATIONAL GREEN TRIBUNAL – RECENT KEY DIRECTIONS

The National Green Tribunal (NGT) has ordered the Uttar Pradesh government to report on the status of the Khurja wetland, and separately directed the UP government to amend official records of encroached wetlands. The NGT Southern Bench in Chennai also demanded a concrete time-bound action plan on other environmental cases.

News in Brief

- NGT is a specialised environmental court established under the National Green Tribunal Act, 2010.
- Principal Bench: New Delhi; four Regional Benches – Bhopal, Pune, Chennai, Kolkata.
- NGT has powers of a civil court and can hear cases related to 7 environmental laws (Water, Air, EPA, Forest Conservation, Biodiversity, PLI Act, Public Liability Insurance).
- It can NOT adjudicate the Wildlife (Protection) Act 1972 or the Forest Rights Act 2006 (not in its schedule).
- Recent directives include wetland protection (Khurja), hilltop ecology, wastewater discharge, and air quality in NCR.
- The Chairperson is a retired Supreme Court judge; minimum composition: 10 judicial + 10 expert members.

Prelims Connect

NATIONAL GREEN TRIBUNAL – QUICK FACTS

Attribute	Detail
Established	NGT Act, 2010; operational from 18 October 2010
Principal Bench	New Delhi
Regional Benches	Bhopal, Pune, Chennai, Kolkata
Applicable Laws	Water, Air, EPA, Forest Conservation, Biodiversity, PLI, Public Liability Insurance
Chairperson	Retired Supreme Court judge
Applies 'Polluter Pays' & 'Precautionary Principle'	Yes (Art 21, R/W Stockholm 1972)

India is the third country after Australia and New Zealand to establish a dedicated environmental tribunal. Its decisions can be challenged in the Supreme Court, not High Courts.

Prelims Pointers

- **NGT Act:** 2010.

- **Principal Bench:** New Delhi; 4 regional benches.
- **Chairperson:** retired Supreme Court judge.
- **7 applicable laws:** Water, Air, EPA, Forest Conservation, Biodiversity, PLI, Public Liability Insurance.
- **Principles:** Polluter Pays + Precautionary Principle.

IUCN WORLD CONSERVATION CONGRESS 2025 – ABU DHABI

The IUCN World Conservation Congress 2025 was held in Abu Dhabi. India launched its National Red List of species. Armenia became the newest IUCN State Member (the 89th) and Tuvalu became the 90th. Vivek Menon, Founder-Trustee of Wildlife Trust of India (WTI), was elected as the Chair of IUCN SSC Asian Elephant Specialist Group.

News in Brief

- IUCN – International Union for Conservation of Nature; world's oldest and largest environmental network, founded in 1948.
- Headquarters: Gland, Switzerland.
- Publishes the IUCN Red List – the global standard for species extinction risk assessments.
- World Conservation Congress is held every 4 years – Abu Dhabi 2025 was the first WCC in the Gulf region.
- Armenia (89th) and Tuvalu (90th) became IUCN State Members at the 2025 WCC.
- India's National Red List was launched at this WCC – nationally downscaled Red Listing for biodiversity.

Prelims Connect

IUCN RED LIST – CATEGORIES

Category	Code	Meaning
Extinct	EX	No known surviving individuals
Extinct in the Wild	EW	Only in captivity / introduced
Critically Endangered	CR	Extremely high risk of extinction
Endangered	EN	Very high risk
Vulnerable	VU	High risk
Near Threatened	NT	Close to qualifying
Least Concern	LC	Widespread, abundant
Data Deficient	DD	Insufficient information
Not Evaluated	NE	Not yet assessed

IUCN was founded in 1948 at Fontainebleau, France – making it the world's oldest environmental organisation. Vivek Menon heads the IUCN SSC Asian Elephant Specialist Group.

Prelims Pointers

- **IUCN:** founded 1948; HQ Gland, Switzerland.
- **WCC 2025:** Abu Dhabi – first in the Gulf.
- **Armenia & Tuvalu:** 89th and 90th IUCN state members.

- **India's National Red List:** launched 2025 at WCC.
- **Vivek Menon:** Chair, IUCN SSC Asian Elephant Specialist Group.

UN CHAMPIONS & YOUNG CHAMPIONS OF THE EARTH 2025

IAS officer Supriya Sahu was honoured with the 2025 UN Champions of the Earth award. Separately, UNEP announced the Young Champions of the Earth Award 2025 in partnership with a climate tech platform. These are UNEP's highest environmental honours.

News in Brief

- UN Champions of the Earth: UNEP's highest environmental award, launched in 2005.
- Supriya Sahu is the Additional Chief Secretary of Environment, Forest and Climate Change, Tamil Nadu.
- Honoured for leadership in mission-mode programmes – Meendum Manjappai (plastic ban), Climate Change Mission, Project Nilgiri Tahr.
- Young Champions of the Earth: also from UNEP, targeted at entrepreneurs aged 18–30.
- Categories of Champions Award: Lifetime Achievement, Inspiration & Action, Policy Leadership, Entrepreneurial Vision, Science & Innovation.
- India has had multiple Champions of the Earth winners – PM Modi (2018), TERI, Afroz Shah, Amitabh Bachchan.

Prelims Connect

NOTABLE INDIAN UN ENVIRONMENTAL AWARDS

Year	Awardee	Award
2005	M.S. Swaminathan	Champions of the Earth
2018	PM Narendra Modi + Cochin Airport	Champions of the Earth
2016	Afroz Shah (Versova Beach)	Champion of the Earth
2018	Kamal Kumar & TERI	Champion of the Earth (TERI)
2025	Supriya Sahu (IAS)	Champions of the Earth

PM Modi was the first serving Indian Prime Minister to receive the Champions of the Earth award (for leadership on ISA and single-use plastic).

Prelims Pointers

- **Champions of the Earth 2025:** IAS Supriya Sahu (TN).
- **Launched:** 2005 by UNEP.
- **Categories:** 5 – Lifetime, Inspiration, Policy, Entrepreneurial, Science.
- **Young Champions of the Earth:** for ages 18–30.
- **PM Modi:** first serving Indian PM to win (2018).

MADHAV GADGIL – CONSERVATION GIANT PASSES AWAY

Renowned Indian ecologist and conservation biologist Madhav Gadgil passed away in Pune at the age of 83. He is best known for chairing the Western Ghats Ecology Expert Panel (WGEEP) that submitted the landmark 'Gadgil Report' of 2011.

News in Brief

- Professor Emeritus at the Indian Institute of Science, Bengaluru; founder of IISc's Centre for Ecological Sciences.
- Chaired WGEEP (2010–11) which recommended classifying the entire Western Ghats as an Ecologically Sensitive Area (ESA).
- The WGEEP Report proposed 3 ESZs (I, II, III) covering different levels of protection; all states pushed back and the Kasturirangan Committee was set up to revise it.
- Kasturirangan Report (2013) reduced the ESA coverage to ~37% of the Western Ghats (instead of 64% in Gadgil's report).
- Gadgil was also a pioneer of People's Biodiversity Registers (PBRs) under the Biological Diversity Act, 2002.
- Received Padma Bhushan (2006), Tyler Prize for Environmental Achievement, and UN's Global 500 Award.

Prelims Connect

WGEEP (GADGIL) vs HLWG (KASTURIRANGAN) – COMPARISON

Aspect	Gadgil Report (2011)	Kasturirangan Report (2013)
ESA coverage	Entire Western Ghats (~64%)	~37% of Western Ghats
Approach	Bottom-up, ecology-first	Top-down, socio-economic balance
ESZ categories	Three levels (ESZ-I, II, III)	Single ESA boundary
Acceptance	States rejected	Conditionally accepted

Madhav Gadgil was a key figure in shaping India's modern conservation thinking. The WGEEP report's rejection is often cited in discussions about landslides and ecological disasters in Kerala and Karnataka.

Prelims Pointers

- **Madhav Gadgil:** pioneer Indian ecologist; passed away in Pune.
- **Chaired:** WGEEP (2010–11).
- **Gadgil Report (2011):** all of Western Ghats as ESA.
- **Kasturirangan Report (2013):** reduced ESA to ~37%.
- **Other contributions:** People's Biodiversity Registers (PBRs).

INDIAN CONSERVATION CONFERENCE (ICCON) 2025 & INDIA NATIONAL RED LIST

The Indian Conservation Conference (ICCON) 2025 – India's foremost platform for conservation science – was held, and India launched its National Red List of species at the IUCN World Conservation Congress in Abu Dhabi.

News in Brief

- ICCON is organised by the Centre for Wildlife Studies (CWS), Bengaluru.
- Brings together scientists, practitioners, managers and policymakers in conservation.
- ICCON 2025 focused on species recovery, human-wildlife conflict mitigation, and AI in conservation.
- India's National Red List: nationally downscaled version of the IUCN Red List for Indian species.
- Launched at IUCN WCC 2025 Abu Dhabi by ZSI + Botanical Survey of India (BSI).
- Will help prioritise species for conservation funding and protection under WPA Schedules.

Prelims Connect

INDIA'S BIODIVERSITY ASSESSMENT BODIES

Body	Role
Zoological Survey of India (ZSI)	Animal taxonomy & Red List assessment
Botanical Survey of India (BSI)	Plant taxonomy & Red List assessment
Wildlife Institute of India (WII)	Ecological research, tiger monitoring
CES, IISc Bengaluru	Academic conservation research
CWS Bengaluru	ICCON organiser; long-term research

India's National Red List goes beyond the IUCN Red List by applying the same criteria to regionally endemic and data-deficient species that are not yet globally listed.

Prelims Pointers

- **ICCON 2025:** India's premier conservation science conference.
- **Organiser:** Centre for Wildlife Studies (CWS), Bengaluru.
- **India's National Red List:** launched at IUCN WCC Abu Dhabi.
- **Lead bodies:** ZSI (animals) + BSI (plants).
- **Purpose:** prioritise species for conservation + WPA schedules.

JAYSHREE VENCATESAN – FIRST INDIAN RAMSAR AWARD FOR WISE USE & SAIME RECOGNITION

Jayshree Vencatesan became the first Indian to receive the Ramsar Award for 'Wetland Wise Use'. Separately, the Sustainable Aquaculture in Mangrove Ecosystems (SAIME) model from the Sundarbans received recognition from a global sustainability platform.

News in Brief

- Jayshree Vencatesan is co-founder of Care Earth Trust (a Chennai-based NGO).
- She has worked for 20+ years on the restoration of Pallikaranai wetland in Chennai.
- Ramsar Award for Wetland Wise Use – one of three categories of Ramsar Awards (Wise Use, Management, Innovation).
- First Indian to win in this category.
- SAIME (Sustainable Aquaculture in Mangrove Ecosystems) is a community-led integrated mangrove-shrimp farming model in the Sundarbans.
- SAIME balances livelihood with mangrove conservation – uses traditional extensive aquaculture without cutting mangroves.

Prelims Connect

MANGROVES – KEY INDIA SCHEMES

Scheme	Focus
MISHTI	Mangrove Initiative for Shoreline Habitats & Tangible Incomes (Budget 2023)
National Coastal Mission	Part of NAPCC – addresses mangroves + corals
CAMPA Funds	Compensatory Afforestation Fund used for mangrove restoration

State Wetland Mission	Kerala, Tamil Nadu have mangrove missions
SAIME model	Community aquaculture + mangrove preservation (Sundarbans)

India's mangrove cover is about 4,992 sq km (ISFR 2023). Sundarbans accounts for ~42% of this; Gujarat is second-largest.

Prelims Pointers

- **Jayshree Vencatesan:** first Indian Ramsar Wise-Use Award winner.
- **Organisation:** Care Earth Trust, Chennai.
- **Ramsar Awards:** 3 categories – Wise Use, Management, Innovation.
- **SAIME:** Sustainable Aquaculture in Mangrove Ecosystems (Sundarbans).
- **MISHTI scheme:** Union Budget 2023 – mangrove initiative.

WORLD SUSTAINABLE DEVELOPMENT SUMMIT 2025 & WORLD HAPPINESS REPORT

The World Sustainable Development Summit (WSDS) 2025 was convened by the Union Environment Minister and The Energy and Resources Institute (TERI), bringing together global leaders on sustainability. Separately, the World Happiness Report 2025 ranked India 118th out of 147 countries.

News in Brief

- WSDS is TERI's annual flagship sustainability summit – held in New Delhi.
- Started in 2001 (initially as Delhi Sustainable Development Summit, renamed 2015).
- TERI is a Delhi-based research institute; its former head was Dr. Rajendra K. Pachauri (IPCC AR4 Chair, 2007 Nobel).
- WSDS 2025 themes: NDC 3.0, climate justice, circular economy, energy transition.
- World Happiness Report is published by the UN Sustainable Development Solutions Network and the Wellbeing Research Centre at Oxford.
- India ranked 118th out of 147 countries in 2025 (a slight improvement from earlier editions).

Prelims Connect

TOP GLOBAL SUSTAINABILITY REPORTS TRACKER

Report	Publisher	Focus
Sustainable Development Report (SDR)	SDSN	SDG Index & global rankings
World Happiness Report	Oxford WRC + SDSN	Well-being + life satisfaction
Human Development Report	UNDP	HDI – health, education, income
Global Gender Gap Report	WEF	Gender parity scorecard
Global Climate Risk Index	Germanwatch	Climate vulnerability

World Happiness Report uses 6 key metrics: GDP per capita, social support, life expectancy, freedom, generosity, and perceived corruption. Finland has topped for 7 consecutive years.

Prelims Pointers

- **WSDS:** TERI's flagship annual sustainability summit (since 2001).

- **TERI:** Energy and Resources Institute, Delhi.
- **World Happiness Report 2025:** India ranked 118/147.
- **Publisher:** SDSN + Oxford Wellbeing Research Centre.
- **Finland:** ranked 1st for 7 consecutive years.

COP-33 CELL ESTABLISHED BY MoEFCC – INDIA'S HOSTING BID

The Environment Ministry has set up a dedicated COP-33 Cell to address the professional and logistical requirements of India's bid to host COP-33 in 2028 – positioning India as a potential climate host after Brazil's COP30.

News in Brief

- COP-33 is slated for late 2028; potential hosts include India, with competing bids from Africa and others.
- MoEFCC's dedicated COP-33 Cell will handle diplomatic coordination, venue selection, logistics and substantive agenda positioning.
- India has previously hosted major UN summits – CBD COP-11 Hyderabad (2012), UNFCCC COP-8 New Delhi (2002), UNCCD COP-14 New Delhi (2019).
- If selected, COP-33 would reinforce India's global leadership role after G20 Presidency (2023) and ISA Founder status.
- India's climate diplomacy aligns with its 'Panchamrit' pledge made at Glasgow COP26 (2021).

Prelims Connect

INDIA'S 'PANCHAMRIT' CLIMATE PLEDGES (COP26 GLASGOW, 2021)

Pledge	Target
1. Non-fossil capacity	500 GW by 2030
2. Renewable share of energy	50% from renewables by 2030
3. Emission reduction	1 billion tonnes CO ₂ reduction by 2030
4. Carbon intensity	Reduce by 45% over 2005 levels by 2030
5. Net-zero target	By 2070

India's updated NDC (2022) reflects pledge 3 (45% intensity cut) and pledge 4 (50% non-fossil cumulative capacity). Pledges 1 and 5 are long-term political commitments.

Prelims Pointers

- **COP-33 Cell:** established by MoEFCC for India's hosting bid.
- **Panchamrit:** 5 climate pledges at COP26 Glasgow 2021.
- **India's net-zero target:** 2070.
- **Earlier UN COPs hosted by India:** CBD (2012), UNFCCC (2002), UNCCD (2019).
- **India's G20:** Presidency held in 2023.

NATIONAL GREEN HYDROGEN MISSION – DEENDAYAL & V.O. CHIDAMBARANAR PORTS

The Ministry of New and Renewable Energy (MNRE) has officially designated Deendayal Port (Kandla, Gujarat) as a Green Hydrogen Hub. India's first port-based green hydrogen project was launched at V.O. Chidambaranar (VOC) Port in Thoothukudi, Tamil Nadu.

News in Brief

- National Green Hydrogen Mission approved in 2023 with an outlay of ₹19,744 crore until FY 2029-30.
- Target: 5 MMT (million metric tonnes) per annum of green hydrogen production by 2030.
- Green Hydrogen is produced by electrolysis of water using renewable energy – zero lifecycle emissions.
- Programmes under the Mission: SIGHT (Strategic Interventions for Green Hydrogen Transition), Green Hydrogen Hubs, pilot projects.
- Deendayal Port (Kandla, Gujarat) and V.O. Chidambaranar Port (Thoothukudi, TN) are among India's first Green Hydrogen Hubs.
- International Conference on Green Hydrogen (ICGH 2025) hosted by MNRE in New Delhi.

Prelims Connect

TYPES OF HYDROGEN – COLOUR CODES

Colour	Source	Emissions
Green	Renewable electricity + electrolysis	Zero
Blue	Natural gas + Carbon Capture & Storage	Low
Grey	Natural gas reforming (no CCS)	High
Brown / Black	Lignite / coal gasification	Very high
Pink	Nuclear energy + electrolysis	Zero
Turquoise	Methane pyrolysis (solid carbon byproduct)	Low

India's green hydrogen ambitions are central to its 2070 net-zero pledge. The 5 MMT target alone is expected to abate ~50 MT of CO₂ annually by 2030.

Prelims Pointers

- **National Green Hydrogen Mission:** approved 2023; outlay ₹19,744 crore.
- **Target:** 5 MMT/yr green hydrogen by 2030.
- **SIGHT programme:** Strategic Interventions for Green Hydrogen Transition.
- **Green H2 Hubs:** Deendayal (Kandla, GJ) + VOC Port (Thoothukudi, TN).
- **Colour codes:** Green (renewables), Blue (NG+CCS), Grey (NG), Brown (coal).

VULTURE NETWORK PORTAL, WHITE TIGER CENTRE & PUNJAB WILDLIFE PUSH

India's first vulture conservation portal – 'The Vulture Network' – was launched by the We Foundation India. A white tiger breeding centre (first of its kind) is being set up in Govindgarh, MP. Punjab announced a wildlife and tourism push. India also relocated Jaigir village from within Palamau Tiger Reserve.

News in Brief

- The Vulture Network portal is India's first dedicated vulture conservation platform.
- Launched by We Foundation India – will track sightings, breeding, rescue & rehabilitation.
- Indian vulture populations collapsed by ~99% since the 1990s due to diclofenac poisoning.
- Diclofenac ban for veterinary use: 2006 (Central Drugs Standard Control Organisation notification).
- White Tiger Centre: first of its kind in India, at Govindgarh near Rewa, MP – the historical home of white tigers.

- Jaigir village in Palamau TR (Jharkhand): successfully voluntarily relocated – model for core-area inviolability.

Prelims Connect

INDIA'S 9 VULTURE SPECIES

Species	IUCN Status
Indian Vulture (<i>Gyps indicus</i>)	Critically Endangered
White-rumped Vulture (<i>Gyps bengalensis</i>)	Critically Endangered
Slender-billed Vulture (<i>Gyps tenuirostris</i>)	Critically Endangered
Red-headed Vulture (<i>Sarcogyps calvus</i>)	Critically Endangered
Egyptian Vulture (<i>Neophron percnopterus</i>)	Endangered
Cinereous Vulture (<i>Aegypius monachus</i>)	Near Threatened
Himalayan Griffon (<i>Gyps himalayensis</i>)	Near Threatened
Bearded Vulture/Lammergeier (<i>Gypaetus barbatus</i>)	Near Threatened
Griffon Vulture (<i>Gyps fulvus</i>)	Least Concern

India's Action Plan for Vulture Conservation (APVC) 2020–25 is being succeeded by an extended 2025–30 plan. Jatayu Vulture Conservation Breeding Centre (Pinjore, Haryana) is India's flagship breeding facility.

Prelims Pointers

- **Vulture Network portal:** India's first vulture conservation platform.
- **Diclofenac ban (veterinary):** 2006.
- **White tiger centre:** Govindgarh, Rewa, MP (historical home of white tigers).
- **Palamau TR:** Jaigir village voluntarily relocated – model.
- **Jatayu Breeding Centre:** Pinjore, Haryana – flagship vulture facility.